My name is Joe Discenza, Senior Analyst with Carleton, Inc., and I'd like to take some time today to talk about 1098-E interest reporting: what's changed, why it changed, and what to do about it.

[AIP] First, I have to define some terms. The Issue Price is the amount disbursed to the student (or the education institution on behalf of the student). Whether origination fees that are paid to the Dept. of Ed. are included in the issue price may still be an open question, but certainly any origination fees kept by the lender are not. For the purposes of our discussion, we'll say the Issue Price is the original loan balance less any origination fees.

[QSI] Qualified Stated Interest, or QSI, is "interest that is unconditionally payable at a single fixed or qualifying variable rate at least annually." Basically, this is the interest portion of the scheduled principal & interest payments. It may or may not also include, probably depending on the technical contract language, payments made during a scheduled interest-only or forbearance period. It categorically excludes capitalized interest (such as at the end of an interim period or deferment, just before scheduled repayment begins), since that's not payable "at least annually."

[OID] Original Issue Discount, or OID, is technically defined as "Loan's Stated Redemption Price at Maturity less Loan's Issue Price." The redemption price includes all payments other than QSI. If this were a standard installment loan, without interest capitalization, deferments, forbearances, and the like, the redemption price would be the total of payments less the interest: the original principal balance. So we can think of the redemption price as the total of the capitalized amounts (everything that bears interest); that's close enough. In a nutshell, we can say that OID is the total of payments, less Issue Price, less the QSI, so it includes origination fees, capped interest, and whatever else went into the total charge payable by the borrower.

[1098-E] In the Final 221 Regulations, the IRS mandates that *all* "interest", including the usual QSI, any capitalized interest, origination fees, and other OID be amortized using the "constant interest method" and disclosed in Box 1 of Form 1098-E as it is paid by the borrower. Arguably, from the borrower's point of view, all that charge is the same, anyway: a cost of borrowing money. Think about it: How did you report paid origination fee and paid capitalized interest before? (You did, didn't you?) Perhaps the paid origination fee was prorated equally over the scheduled payments. What an accounting nightmare if the borrower makes a large prepayment, suddenly cutting years off the maturity; how do you redistribute the remaining fee if you're not even sure how much life of the loan remains? And was capitalized interest reported as paid on a pro rata basis, as well? Or by some other method?

[IRS] So rather than having two or more ways to allocate these deductible charges over the life of the loan, the IRS felt it would be simpler (and maybe even easier) to have it all amortize together. Perhaps they're on to something. Mary Doyle, Sallie Mae's Vice President for Tax and Accounting, put together a thorough presentation a couple of years ago, "1098-E Reporting under the Final 221 Regulations," that discussed the IRS's new reporting requirements. I've taken my definitions from this presentation. She uses the term "yield" rather than "interest" to refer to this total of QSI, OID, and capitalized interest, and we've adopted that name, as well.

[1098-E Only one] The task for a lender (or servicer) is to generate this yield for Box 1. Yes: All of the paid yield goes in one box. There isn't one box for QSI, one box for origination fee, one box for capitalized interest, and one for "other"; to my knowledge, there's no need to report QSI or OID separately at all, so from here on, I'm not even going to mention QSI and OID; I will only talk about the total yield. To use the "constant interest method," we have to compute an internal rate of return, or yield rate, such that the *scheduled* payments (and that's important) amortize the Issue Price (that is, the loan amount less any origination fees) to zero. Really, it's just like an APR, and that's why Carleton's Student Loan Yield Module makes it easy.

[Slide of early CFC rate chart] Carleton has built its reputation on computing these rates, in the form of APRs, since 1969. Besides our Yield Module, we've also got a Student Loan APR Module designed especially to meet the needs of student lenders, handling multiple disbursements and long interim periods (and can even compute an interim APR). Let me share with you the third thing a Carleton employee learns, after where the restrooms are and how to refill the coffee maker: The APR, just like this yield rate, is computed *after* the payment schedule has been determined, and so is in an important sense artificial. Timing of payments, origination fees, compounded versus U.S. Rule, and other factors all combine to give a yield rate or APR that may bear little resemblance to the computational interest rate. If any of you would like to explain to a car dealer in Arkansas why he's out of compliance if he naïvely discloses his interest rate as the APR, be my guest.

[Sample Transaction] Through this talk, I'll try to stick with one example, which I'm showing here: Of the $9,000 starting principal, $250 is origination fee, so the Issue Price is $8,750 on the disbursement date, December 21st, 2006. The 2 5/8% interim interest rate is a teaser, converting to the 6% repayment rate and capping the accrued interest of $351.09 on June 15th, 2008, one month before the twenty year repayment term begins. The regular payment is $67.00, with a $64.21 final payment on June 15th, 2028. This long "interim period" before the first payment, especially with a subsidized or teaser rate (possibly 0%) in that period, is one of the special qualities of student loans. For interest computations, I'll use the same calendar that our yield module does when it computes payment schedules: whole months earn 1/12 of a year's interest, and odd days each earn 1/365. You may use a different interest calendar for origination and/or payment posting, but passes the IRS "reasonableness" test.

[Slide of cashflows, showing AIP] As long as we know the current Adjusted Issue Price (AIP, the balance of the Issue Price as we "amortize" at the yield rate), net of the last event, and the remaining *scheduled* payments, we can compute a yield rate. The initial yield rate for our example, as you can see, is 5.7647%. This is the single rate (given the accrual method I'll talk about in a moment) that lets the scheduled payments amortize the AIP to zero. You'll note that the capitalized interest doesn't appear here. Yield cashflows only take into account money received by the borrower (or the school, as proxy) or submitted by the borrower. Although the capitalized interest does increase the principal, it does *not* change the AIP. Also, the yield rate is always prospective, forward-looking. All that matters is where we are (the AIP) and where we're going (the remaining scheduled payments), not how we got here.

[Mary Doyle's slide] Mary Doyle raises the important issue of "re-yielding" events; in fact, she devoted a lot of her effort (about a quarter of the slides from her presentation at least mention re-yielding) to determining exactly what events would force computation of a new yield rate. She lists events that include rate changes, prepayments, deferment, delinquency, or failure to qualify for borrower benefits (because until the borrower fails to qualify, we have to base our yield on payments that assume the borrower will take advantage of any benefits, so failure will change those scheduled payments). Basically, any time the schedule of payments changes, or the AIP changes in an unscheduled way, the yield rate we have is no longer valid. After all, it's defined by the relationship between the AIP and the payment schedule.

But Carleton has been computing APRs for almost four decades, and we think we're pretty good at it. Carleton's Student Loan Yield Module simply re-computes the yield rate with every event, so there are no quandaries about what events trigger re-yielding. We have chosen, following Mary Doyle's analysis, to compute a yield rate that compounds monthly; that is, we set the yield accrual period to one month, with possible “interruptions” by events like disbursements, rate changes, or unscheduled payments. We also count time *backwards* from the current event to the last event (using the so-called Federal Calendar for Reg Z Truth-In-Lending actuarial APRs). You might choose another accrual method for determining the yield rate, but what’s important is that, however the yield rate is determined, the dollar amount of the earned yield must be computed in the same way (in our case, monthly compounding and backwards time counting).

[Graph of AIP, yield and payment] Now that we know the yield rate, let’s look at the mechanics of earning and paying actual yield. Given the yield rate and the AIP, we calculate the *earned yield* between the last event and the current event. In our example, by January 11th, 2007 (counting months backwards from May 11th, remember?), the $8,750 has earned $29.42 in yield; by February 11th, that $8,779.42 (remember, we’re compounding) has earned an additional $42.18, and so on. Now suppose the borrower has gotten a sweet tax refund from our friends at the IRS, and makes a $350 payment on May 11th. By that date, the total earned yield is $199.33. The payment is applied first to the earned yield and the remaining $150.67 reduces the AIP to $8,599.33. The borrower is credited with paying the earned yield.

[Nearly identical graph of AIP, leaving some red unpaid yield above the yellow] Unpaid yield is added to the AIP (compounding again). If, instead, the borrower only makes a $150 payment, that is less than the earned yield, so the borrower is only credited with paying $150 yield (the amount of the payment—it’s all yield). Although $49.33 unpaid yield is compounded into the AIP (so the AIP *increases* to $8,799.33), we still keep track of it separately so we know when the borrower pays off all the earned yield and starts paying off more of the original Issue Price.

[Filled-in 1098-E] Do this computation for every event in the borrower’s tax year (how does a civilian go about declaring a different fiscal year, anyhow?), keep track of the AIP and earned but unpaid yield from event to event, and accumulate the paid yield amounts to get your Box 1 amount. In our example, the $350 tax-refund prepayment is the only 2007 payment, so the 2007 1098-E will have $199.33 in Box 1.

Perhaps I’ve omitted one tiny detail. We know how to determine the paid yield once we’ve got the yield rate. We know how to compute the yield rate given the AIP and the schedule of payments. We know how to track the AIP, starting with the original Issue Price, adding the earned yield, and subtracting the borrower payments.

[Cashflows slide again, with principal] But where does the payment schedule come from? Well, you may know it, or you may know the payment amounts but not the term, or you may know the term but not the amount. Here you see the cashflow diagram of the loan as originally disclosed. I’ve shown the capitalization of interest at the end of the interim period with a dotted arrow, because it’s not really a “flow”, although it increases the principal balance.

What we must do is make sure the scheduled payments used to compute the yield rate reflect the principal balance. If the balance has increased or decreased more than expected (a large prepayment, or a new fee, or capitalized interest), the payments may not reflect that principal, and will need to be calculated. Subsequent disbursements, also, fall in this category; when you originally disclosed the payment schedule to the borrower, was it for only the first disbursement, or all scheduled disbursements? Yield can only be earned on money already disbursed, so the schedule of payments used to compute the yield rate between the first and second disbursements must reflect only the amount of principal from the first disbursement. Carleton’s yield module easily handles those situations: subsequent disbursements are just negative payment events that increase, instead of decrease, the AIP.

[Same slide, with the prepayment] But for this example, let’s throw in that unscheduled $350 prepayment in May. Now what’s the payment schedule? Well, given the earned interest to the payment date, the new balance is reduced to $8,844.18, which either shortens the term by seventeen months (keeping the $67.00 payment) or reduces the payment to $64.43 (keeping the twenty year term). Perhaps you went ahead and disclosed a new payment schedule to the borrower. Most likely, however, you didn’t. Much of the rest of this talk, then, will assume that you’re asking our module to compute the scheduled payments for you.

In order for the module to compute the payments, it must be told the correct principal balance; but you’re tracking that already, right? Fees (conversion fees), capitalization events, and the like all change the balance. The balance before such an event gives one payment schedule, and the balance after gives another. Those different schedules, in turn, give rise to different yield rates (especially since those events *don’t* change the AIP). So we need to calculate the earned yield up to a balance change (using the old schedule and yield rate), and then figure new yield after the change. Earlier, we determined the earned yield up to the $350 payment was $199.33; when we re-compute the yield rate after that payment, we get 5.7742%, giving $603.66 earned yield from then to the first payment. Compare this total yield up to the first scheduled payment, $802.99, to the total yield for that period without the prepayment, $826.49. The $23.50 difference can be chalked up to the compounded yield on the $350 that was paid down.

When you need to re-compute the payment schedule when there isn’t a payment, such as for an interest capitalization or a fee charge, send those events to the module with the input field for “current payment” set to zero. I call these “zero-payment events”. While the borrower hasn’t made a payment, and so there will be no *paid* yield, it lets us properly calculate *earned* yield up to the date that the principal changes, and then, at the next event, we’ll have the correct principal net of the “last event” (which will have been this zero-payment event) to create the new payment schedule. Basically, a zero-payment event gives us a date on which we can “hang our hat” when something interesting happens.

[Rate change cashflow slide] Rate changes, too, should be indicated to the yield module by sending a zero-payment event. This allows the module to calculate the earned yield using the scheduled payments up to the rate change date, and then calculate new payments and correct yield from the time of the rate change. Suppose we have a rate change on January 1st, 2008, increasing both the interim and repayment rates by half a percent. To make the yield computations, we’ll send a zero-payment event to the module to capture the yield from May 11th (the prepayment) to January 1st, with the principal net of May 11th and the old rates. This will use the (internally computed) schedule of 240 payments of $64.43, the yield rate of 5.7742%, and give earned yield of $323.82. Then we look at the principal (which hasn’t changed, since there’s no capitalization of interest yet) and the unpaid interest earned between May 11th and January 1st ($147.25), compute the rest of the interest to the conversion date at the new rate ($124.45), and from that capitalized total, the 240 payments at $67.20. From January 1st to July 15th, we earn another $305.77 at the new, higher, yield rate of 6.2675%, for a total yield now of ($199.33 + $323.82 + $305.77 =) $828.92.

Whew! That’s a lot of numbers. Luckily, most of them you don’t have to worry about; our module hides all the gory details, and just gives you the results you need. The AIP and any unpaid yield are outputs from the module, and you just send them back in with the next event. Principal, unpaid interest, and the rates are in your transaction records (remember, those are all net of the *last* event, not the current one).

Do you remember I mentioned that long interim periods, often at lower rates than the repayment rates, are a common feature of student loans? Well, that has a curious—some might say pathological—effect.

While the computational interest rate is only about 3%, the yield rate has been around 6%. In the same time that we would earn $828.92 in yield (from origination to the first payment date), we would only earn $412.40 in interest. The total to-date yield is, in fact, more than the to-date interest *plus* the entire origination fee of $250. I've been told (thanks, Jaye) that this sort of situation was one of those presented to the IRS while the regulations were under comment: that subsidized loans and teaser rates effectively front-load the yield. Let's take this situation one step farther into yield madness.

[Cashflows with payoff] What happens if the borrower decides to pay off the loan in one lump sum before repayment begins? Let's add that complication to our example. Suppose the borrower got a rate-change statement after January 1st showing the current outstanding balance ($8,741.88 in principal and $147.25 earned but unpaid interest), and on April 1st pays that amount. $68.30 more interest will, of course, have accrued; the borrower will see that on the next statement, and pay it immediately (say on April 16th), paying off the loan (you'll probably forgive the nine cents that accumulated between the two payments).

For the lump-sum payment, we set up our call to the module as if we don't know what's coming (because, as of January 1st, we don't), asking for a 240-payment schedule to pay off the principal and unpaid interest. At the new yield rate of 6.2675%, we earn $140.56 new yield; added to the unpaid yield of $323.82, the paid yield is $464.38, and the remaining AIP is $174.58.

I have one quick thing to say about these near-payoff events, where there's just a small balance left (in our example, interest earned since the last statement), relating to the big question mark over the payment schedule. Before making the next event call to the module, ask yourself: Do you really still expect 240 payments? No, you probably only "expect" one more. So, if you've got more events after the principal plus unpaid interest has been reduced to almost nothing, make sure you ask the module to only calculate a single payment. Alternatively, we've recently enhanced the module to return its calculated payment; knowing that and the now-reduced principal, you can estimate the term to pass in.

So for the final event of this loan, we'll ask for a schedule with only a single payment instead of 240, and we might as well set the first payment date to the current payment date. Now, before we go further, notice that the single scheduled payment will be $68.39, and the AIP is $174.58; how do we find a yield rate that amortizes the AIP with a payment smaller than itself? Well, there's nothing in the math that says we can't have a negative yield rate, and that's exactly what we get: -1459.8236%. Thus the "earned yield" is also negative, which really just means we over-reported the yield previously. This is exactly the problem with the front-loading of yield created by subsidized or teaser interim rates. But don't give up hope: the math *will* work out, I promise.

The module is capable of computing these negative yield rates when necessary. That's obviously the case here, so we see a "paid yield" of $-106.19, and a final remaining AIP of $0.09 (note that's exactly the earned interest over the intervening fifteen days). The naive thing to do is actually the right thing: add that negative yield into the accumulator, giving a total paid yield for 2008 of $358.19. Then, because this is the end of the loan, if there were any unpaid yield left, we'd subtract that from the remaining AIP, since it was never really earned in the first place. Finally, if the AIP is still positive (nine cents, in this case), subtract it from the accumulator, leaving $358.10. (These rules apply to the end-of-life of every loan, not just prepaid ones, but loans that amortize normally are likely to have no unpaid yield and little or no remaining AIP. It's nice not to have exceptions!)

[Yield = Interest + Orig] So our total yield over the life of the loan is that $358.10 plus the $199.33 from 2007, giving $557.43. The borrower has also paid interest: $91.88 on May 11th, and then $147.25 on

April 1st (earned up to January 1st), and finally, on April 16th, the $68.30 earned up to April 1st, totaling 307.43. That, together with the $250 origination fee, should equal the total paid yield, and sure enough, it does. Well, I promised, didn't I?

Let me stress here that our choice of yield accrual method made no difference. If you repeat the yield calculations using compounding only at the events (instead of monthly) with a forward monthly time count, you still end up with paid yield, after the lump-sum payment but before the final payoff, of $660.83, $103.40 over the true total yield. Of course, the negative yield and remaining AIP after the payoff balance that out.

But I see the burning question in your eyes: Hey, Joe, what if the lump-sum had been in late December of '07, and the payoff in early January '08? What if there *wasn't* any yield in the '08 accumulator when we got that negative "paid yield"? I'm afraid I don't have a definitive answer. If your annual accumulator is negative at the end of the year (or the end of the loan), it means the over-report stretches back into the previous year. We'll have to let the lawyers' chorus decide whether a revised 1098-E for the previous tax year needs to be sent, or if it's sufficient to just send a $0 paid yield for the current tax year.

Perhaps, in a case like this example, the payoff could be attributed to the previous tax year (since it came in well before the reporting deadline). However, you'd have to recognize it in time to do that for the '07 1098-E; catching it while you're preparing the '08 form would be a little late. In fact, it might be good practice to process the new year's events just to catch these. No matter how we choose to handle it, it's the IRS's own fault: this is an unavoidable consequence of the mathematics that implement the regulation.

Before you whip out those cellphones to call the lawyers and lobbyists, I need to remind you that so far, I have only seen this happen with large prepayments early in the life of loans with some combination of long interim period and large difference between the interim interest rate and the repayment interest rate (the larger the difference, the shorter the interim period has to be, and vice-versa).

[Monsters] That is the only scary monster in the constant-interest-method closet. While the new method has its complications, it does save a lot of trouble over, for example, straight-line origination fee accrual (prorated over the payments, or the whole term?). And when does the borrower get to deduct capitalized interest? No longer do you need to have multiple amortization timetables for reporting deductible charge to the borrower. The new method might have a surprise associated with large prepayments, but how much prorated origination fee would the same prepayment have earned? Anyone? Even (internal) consolidations are easy with our module: Pass a zero-payment event to each underlying loan as of the consolidation date, and just add all those AIP and Unpaid Yield results to be the first inputs of the new, consolidated loan when it was its first event. Finally, while Mary Doyle made it sound complicated, with her distinction between QSI and OID and her concerns about when you would be forced to recomputed the yield rate, it is really a straightforward, effective, and, most of all, equitable method of reporting a borrower's deductible charge.

Now's a good time to catch your breath, straighten your knees, and get that oxygen flowing to your brain, because we're about to look at APR computations. First, if Truth-In-Lending is Mosaic law, this right here is Talmudic commentary: Appendix J. It tells you everything the best minds at the Federal Reserve think you need to know to compute a compliant APR (note I said "a" and not "the" compliant APR). Reprints, like this one, are available from Carleton; for all I know, they're available on the web and from Pueblo, Colorado, too.

Appendix J actuarial APRs are compounding rates, as I mentioned earlier in the yield section. We compound our yield rate monthly, but the APR compounds at a frequency known as the "unit-period." There are very strict rules for determining the unit-period from the schedule of disbursements and payments. The most important rule is that the most common period (if any) is the unit-period, so as soon as you have twenty years of monthly payments, it's safe to assume the unit-period is one month, regardless of the pattern of disbursements and payments before true repayment begins.

[unit-period flowchart] But for some reason student lenders are permitted to disclose an interim-period APR as opposed to a full-term APR, and that has caused consternation. Interim-period APRs are predicated on the theory that the actual repayments are unknown, but are somehow equivalent to a lump-sum payment due at conversion. For such "single-payment" transactions (there might be scheduled interest-only payments in the interim period), we use this flowchart to determine the unit-period. This may be hard to read up here on the screen; let me talk through it. First, if there's only one advance (and no other scheduled payments), it's easy: The unit-period is the term, either in whole months or in days, but never longer than a year (actuarial APRs *must* compound at least annually). Otherwise, we measure the periods between each successive event, both in days and in whole months where we can. Look for common periods (quarters, months, some number of days); if there are any, the most common is the unit-period (or the shortest of any equally most common). If there aren't, average the periods. If all the periods are months, average the months, and if that average is an even number of months, that's your unit-period. Otherwise, find the average period in days, and find the closest multiple of a week (if the average is exactly halfway between two multiples, take the shorter one) as the unit-period. In any case, the unit-period may not exceed a year (eleven months is okay, but twelve is already one year; fifty-two weeks is okay, but not fifty-three).

[APR example] Let's apply this to our example transaction, with an Amount Financed of $8,750.00 and balance ($9,000.00 principal plus $351.09 accumulated interest) of $9,351.09. That really is single-advance (on 12/21/2006), single-payment (on the conversion date of 6/15/2008); since the period is greater than a year, the unit-period is a year. Using that unit-period, we correctly compute the Appendix J actuarial APR as 4.5669%. If you naïvely used one month as the unit-period, you would arrive at 4.4789%. This *particular* example does not happen to be out of compliance (that is, more than an eighth of a percent from the correct value), but it is easy enough to concoct examples where the naïve method would be.

I did say the actuarial APR is only *a* correct APR, didn't I? If you choose, you can compute a U.S. Rule APR, and not worry about a unit-period, since there's no compounding. You can just divide the Finance Charge ($601.09) by the Amount Financed, then by the number of days (542), and then multiply by 365 to get 4.6262%. Or you can take the ratio of Finance Charge to Amount Financed, and divide by (376/365 + 166/366) to get 4.6301%, if you earn interest on a 366-day basis in leap years. Oh, dear, I just got three correct APRs (and one incorrect!) in two paragraphs, and single-advance, single-payment transactions are the simplest of all. I can almost always get at least four or five correct APRs for a given loan.

[Multi-disbursement unit-period example] This is just another example that pretty much speaks for itself. The periods between the disbursements are thirty-three days each (no even months here), and between the last disbursement and the payment is nine hundred nine days. We have two periods in common, so that's the unit-period. If one of the three disbursement dates were moved by even a day, we wouldn't have a common period and would have to average. For example, if the first disbursement is a day later, we now average all three periods to 324.67 days, which is closest to forty-six weeks. One of the rules of Appendix J is that the averaged unit-period can't be a multiple of days.

Now, it *can* be a multiple of months, but our interpretation is that this can only happen if all the periods you're averaging are months and the average is also an even number of months. Here's why we reach that conclusion: You could simply look for the nearest multiple of thirty days and call that a multiple of a month, but that falls apart with the obvious example of 360 days. Twelve months? But that's a year, and that can't be the unit period when the average is 360 days, since the closest multiple of a week is fifty-one weeks: 357 days is closer than 365. We've tried finding multiples of 365/12 (30.4167) days, but that's just ugly. The best argument in favor of using multiples of a month is sixty days, which is certainly closer to 59, 60, 60.8333, 61, or 62 days (all possible numbers of days in "two months") than to 63 days (nine weeks), but we've shown that the method breaks down for most other examples.

[PV vs. rate graph] Once we know the unit-period, we can use the formulas in Appendix J to find the present value of the cashflows at any given rate; that's just algebra. Unfortunately, there's no way to directly solve for the rate that gives a present value of 0 (which is a definition of the APR; another is the rate that gives a payoff of 0 when the loan is amortized). We need to find that rate iteratively. I will demonstrate the process of iteration by linear approximation. If you graph the rate as the *x*-coordinate versus the present value (or payoff) as the *y*-coordinate, you get a curve similar to the one shown here in white. If you pick two points on the curve, you can draw a line (in yellow) between them and see where it crosses the *x*-axis. The top formula in the blue box is just the general formula for a line; to find where it crosses the *x*-axis, you just set *y* to zero and solve for *x*. That solution is just the old x0 plus an adjustment. If you then use that *x*-value as a new rate (the dotted red line), you'll find a new present value, and you can replace one of the old points with the new one, and repeat the process.

[second iteration] See how the approximations get closer and closer to the true zero of the curve? The adjustment gets closer and closer to 0; when it's close enough, you stop. What constitutes close enough? We like to have really accurate APRs, so our tolerance is rather small; but you could certainly use something like one ten-thousandth of a percent. Also, if one point has a positive present value and one has a negative present value (like I've shown), you know the APR is between those two rates; once the difference between the bounding rates is less than the eighth of a percent compliance tolerance, you could stop, knowing your APR is at least compliant, if not precise.

[iteration example] Let's use our favorite example again to show the iteration. We'll start with the disclosed interest rate (which we know will be low because the Amount Financed is less than the principal), find its present value, and then adjust at random (1% seems to work pretty well). Alternatively, you could use 0% as your other point; the present value is simply the Amount Financed less the payments, so that's a very quick calculation for a computer. In any case, now we have two points, and we can compute our first adjustment. Replace the point with the present value farthest from zero, and repeat. Our adjustment is now really small, only a couple ten-thousandths of a percent; but I said we'd use one ten-thousandth, so we'll go just one more time, and we're done. (The adjustment here really isn't zero; it's about three ten-millionths of a percent. Forgive me?)

Linear iteration isn't the best convergence method for APRs, but as you see, it's quite serviceable and very simple both to describe and to implement. This example actually converged immediately (after the first real adjustment) to a *compliant* APR; we just didn't know it. It also would have converged (within compliance) after the first adjustment even if we'd started with 2.625% and 0% as our first rates. Just don't count on that happening. The convergence method shown in Appendix J is a variation on the linear method, but as written only applies to single-advance transactions.

Your best defense when an examiner questions your APRs is self-knowledge. Do you disclose U.S. Rule or actuarial APRs? If actuarial, what is your unit-period? If U.S. Rule, what is your accrual calendar? Do you solve by finding the zero of the amortization payoff or, for actuarial, the formula present value? Ask the examiner what he or she uses, as well. Having these answers ready will aid you whenever questions arise.

By next week, an electronic version of this presentation, both text and slides, will be available at carletoninc.com; select “Student Lenders” from the “Services” menu. I will try to incorporate any of today’s questions into our yield FAQ there, as well. Thank you.