Econ 156
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Midterm Answers

1. When the profit rate ρ is larger/smaller than the shareholders' required return R.

2. The car loan is amortized. Each monthly payment covers the interest due and also reduces the unpaid balance, until it hits zero at the end. Instead of borrowing \$12,000 for four years, the customer would be borrowing \$12,000 at the beginning and almost nothing at the end, so that the average amount borrowed would be about half the initial loan. That's the sales manager's trick: comparing 12 percent interest on roughly half of \$12,000 with 7 percent interest on \$12,000.

3. According to the intrinsic value model, growth stocks are actually very sensitive to changes in required yields. As discussed in the text, growth stocks have long durations and high capital risk.

4. (a) For deciding whether stocks are currently cheap or expensive, it makes more sense to look at the current price, rather than prices over the past 10 years.

5. Interest rates were at historic lows. It could also be the case that a recession caused earnings to slump and stock prices to decline, but not as far because the drop in earnings was thought to be temporary.

6. The values for R and g seem low, but a much bigger problem is that the units for R and g in the dividend discount model $P = D/(R - g)$ should be fractions, $R = 0.035$ and $g = 0.02$ rather than percents $R = 3.5$, and $g = 2$. In addition, a dividend-payout ratio of 3 (dividends equal to three times earnings) is extremely unusual. A typical value would be closer to 0.5.
   A better set of assumptions would use values like these:
$$PEG = \frac{d}{(R-g)g\%} = \frac{0.5}{(0.10-0.05)5} = 2$$
$$PEG = \frac{d}{(R-g)g\%} = \frac{0.5}{(0.15-0.10)10} = 1$$

7. Banks make money from the spread between what they pay depositors and what they charge borrowers, not from the level of interest rates. In fact, the high interest rates in 1979-1981 nearly bankrupted the banking industry.

8. Working through the annual increase in wealth:
$$\begin{aligned}
W_0 &= X \\
W_1 &= X(1+R)^1 + X \\
W_2 &= X(1+R)^2 + X(1+R)^1 + X \\
&\vdots \\
W_t &= X\left(1+(1+R)^1+\ldots(1+R)^t\right)
\end{aligned}$$
   Setting $X = RW_t$

$$X = RW_t$$
$$X = RX\left(1+(1+R)^1+\ldots(1+R)^t\right)$$
$$1 = R\left(1+(1+R)^1+\ldots(1+R)^t\right)$$

(Not needed in answer.) This can be simplified:

$$1 = R\left(\frac{1-(1+R)^{t+1}}{1-(1+R)}\right)$$
$$1 = (1+R)^{t+1} - 1$$
$$(1+R)^{t+1} = 2$$
$$t+1 = \frac{\ln\left[2\right]}{\ln\left[1+R\right]}$$
$$t = \frac{\ln\left[2\right]}{\ln\left[1+R\right]} - 1$$

For example, for R = 0.10, t = 6.27 years.

9. The modified duration is approximately equal to the percentage change in the price resulting from a one-percentage-point increase in the required return. Since perpetuity prices do not change by infinite amounts, the modified duration is not infinite.

10. Inflation reduces the real value of fixed, long-term obligations; however, if inflation is the order of the day, long-term bonds will have high interest rates that take this inflation into account.