Sauder School of Business **COMM 371**
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Problem Set 2 - Solution Notes

1. (a) If the 5% is an EAR, you will have

$$\$10,000 \times (1+5\%)^3 = \$11,576.25.$$

(b) If the 5% is a quarterly APR, the quarterly rate is

$$\frac{5\%}{4} = 1.25\%.$$

In 3 years, you will have

$$\$10,000 \times (1+1.25\%)^{12} = \$11,607.55.$$

(c) If the 5% is a monthly APR, the monthly rate is

$$\frac{5\%}{12} = 0.417\%.$$

In 3 years, you will have

$$\$10,000 \times (1+0.417\%)^{36} = \$11,614.72.$$

2. (a) Miranda is right because Bunny's calculation does not take into account the time value of money.

(b) Denoting each payment by C, the present value of the 10 payments is

$$\frac{C}{(1+4\%)^3} + \frac{C}{(1+4\%)^6} + ... + \frac{C}{(1+4\%)^{30}}.$$

We can compute this sum using the annuity formula, provided that we define the three-year rate x as

$$x = (1+4\%)^3 - 1 = 12.49\%.$$

The present value is

$$\frac{C}{12.49\%}\left[1 - \frac{1}{(1+12.49\%)^{10}}\right].$$

Setting this present value equal to \$700K, we find $C = \$126,365.7$.

3. (a) The monthly rate is
$$\frac{1.9\%}{12} = 0.158\%.$$
The amount of the loan is \$25,000-\$3,000=\$22,000. The monthly payment can be computed by the annuity formula
$$\$22,000 = C \times \left[\frac{1}{0.158\%} - \frac{1}{0.158\% \times (1+0.158\%)^{60}}\right].$$
Solving for C, we find \$384.65.

(b) To compare the two options, we need to compare the present values, at the 5% interest rate. The PV of the second option is obviously \$25,000-\$2,000=\$23,000. The PV of the first option is the downpayment of \$3,000 plus the PV of the monthly payments. To compute the latter PV, we use the annuity formula. The monthly rate is
$$\frac{5\%}{12} = 0.417\%$$
and the PV is
$$\$384.65 \times \left[\frac{1}{0.417\%} - \frac{1}{0.417\% \times (1+0.417\%)^{60}}\right] = \$20,382.82.$$
The PV of the first option is \$23,382.82. You should go for the second option.

4. (a) The EAR is
$$EAR = \left(1 + \frac{APR}{12}\right)^{12} = 7.23\%.$$

(b) The monthly rate is
$$x = \frac{APR}{12} = 0.583\%.$$
The monthly payment C can be computed by the annuity formula:
$$\$500,000 = C \times \left[\frac{1}{0.583\%} - \frac{1}{0.583\% \times (1+0.583\%)^{360}}\right].$$
Solving for C, we find \$3,326.5.

(c) What you owe the bank immediately after the twentieth monthly payment is the PV of the remaining 340 payments. This PV can be computed by the annuity formula
$$\$3,326.5 \times \left[\frac{1}{0.583\%} - \frac{1}{0.583\% \times (1+0.583\%)^{340}}\right] = \$491,330.7.$$