1. **(5 points)** *Which is a better investment: investment A earning 4.9% annual interest compounded quarterly, or investment B earning 4.8% annual interest compounded monthly? Include reasoning or calculation; an answer alone is insufficient.*

   We could calculate the Annual Percentage Yields (APYs) for the two investments and determine that way which one is better; recall that the formula for an APY with n compounding periods per year and annual rate r is $(1+\frac{r}{n})^n - 1$:

$$APY_A = \left(1+\frac{0.049}{4}\right)^4 - 1 \approx 0.04991 = 4.991\%$$

$$APY_B = \left(1+\frac{0.048}{12}\right)^{12} - 1 \approx 0.04907 = 4.907\%$$

   Since the APY on investment A is larger, investment A is better.

   Alternatively, if you dislike APY calculations, you could plug in an arbitrary present value and time scale for both, and determine the future values for the two investments, picking whichever is larger. For instance, if you decided to invest \$5000 for two years, you would get:

$$F_A = 5000\left(1+\frac{0.049}{4}\right)^{4\cdot 2} = 5511.53$$

$$F_B = 5000\left(1+\frac{0.048}{12}\right)^{12\cdot 2} = 5502.74$$

   and since \$5511 is more money than \$5502 (albeit not by much), investment A is better.

2. **(5 points)** *You have invested \$2000 in a 42-month certificate of deposit which pays 2.3% annual interest, compounded semiannually. How much will this CD be worth at the end of the 42-month investment period?*

   Using the future-value calculation $F = P(1+\frac{r}{n})^{nt}$ with present value $P = 2000$, annual interest rate $r = 0.023$, period-per-year quantity $n = 2$ (given by the word "semiannually"), and time frame $t = \frac{42}{12} = 3.5$, we can calculate the resulting future value

$$F = 2000\left(1+\frac{0.023}{2}\right)^{3.5\times 2} = \$2166.66.$$

3. **(5 points)** *A municipal bond will mature in 25 years to a value of \$25,000 and has an interest rate of 1.8%, compounded annually. What is the price of this bond?*

   Here we know the desired future value of an annually compounding investment; it should reach a value of $F = 25000$ at an interest rate of $r = 0.018$ over a time $t = 25$. Using the rearranged formula to determine P:

$$P = \frac{25000}{(1+0.018)^{25}} = \$16004.63.$$

4. **(5 points)** *A bank offers you a loan of \$1000 under the conditions that \$1300 be repaid in five years. What* annually compounded *interest rate are they charging?*

   Here we have both a present value $P = 1000$ and a future value $F = 1300$, together with a time frame $t = 5$, and we wish to find the interest rate. Using our rearranged formula:

$$r = \left(\frac{1300}{1000}\right)^{1/5} - 1 \approx 0.0538 = 5.38\%.$$