Math 111 Worksheet #11 Solutions

Present Value of an Ordinary Annuity: $P = R[\frac{1-(1+\frac{r}{k})^{-kt}}{\frac{r}{k}}]$

P = Present Value (value at $t = 0$) $\quad$ k = # compounds each year
R = Recurring Payment $\quad$ t = # years
r = annual rate (in decimal form)

1. What is the present value of an ordinary annuity of \$2,000 every 6 months for 15 years at 9% compounded semiannually?

   Quantities:
   $R = 2000,\ r = .09,\ k = 2,\ t = 15,\ P = ?$

   $$\Rightarrow \quad P = 2000\Big[\frac{1-(1+\frac{.09}{2})^{-2(15)}}{\frac{.09}{2}}\Big] = 2000\Big[\frac{1-1.045^{-30}}{.045}\Big] = \$32577.78$$

   So, the present value of the ordinary annuity is \$32577.78.

2. You buy a new car at \$24,000 with a 5 year car loan. How much would you have to pay each month if the loan has 6.6% interest compounded monthly?

   Quantities:
   $P = 24000,\ r = .066,\ k = 12,\ t = 5,\ R = ?$

   $$\Rightarrow \quad 24000 = R\Big[\frac{1-(1+\frac{.066}{12})^{-12(5)}}{\frac{.066}{12}}\Big] = R\Big[\frac{1-1.0055^{-60}}{.0055}\Big]$$

   $$\Rightarrow \quad R = 24000\Big[\frac{.0055}{1-1.0055^{-60}}\Big] = \$470.71$$

   The monthly payment would be \$470.71.