Note: The points assigned to each question are given in parentheses to the left of the question. The assignment is worth 30 points (3% of your total for the class).

(2) 1. a. If you invest $1,000 in a bond that earns 7% annually, how much would it be worth in 10 years?
   \[ V_n = V_0 (1 + i)^n = 1000(1.07)^{10} = \$1,967.15 \]

(2) b. If you invest the same $1,000 in stocks that earn 9%, how much will your investment be worth in 10 years?
   \[ V_n = V_0 (1 + i)^n = 1000(1.09)^{10} = \$2,367.36 \]

(2) c. Stocks tend, on average, to earn a higher rate of return than bonds. On the other hand, the return on a bond is guaranteed, while there is no such guarantee with stocks. Explain why some people invest in bonds while others invest in stocks.

   Different people have different attitudes toward risk. People who are more risk averse will tend to prefer bonds over stocks because they are safer, while people who are more comfortable taking risks will tend to prefer stocks because they tend to offer higher expected returns. Most smart investors will actually have some stocks and some bonds in their portfolios, and the proportion of each will reflect their attitudes towards risk.

2. A forested property in McKean County, PA pays an annual property tax of $7.00 per acre. Assume that the only revenue from the property is from timber harvested at the end of the rotation, so the cost of the tax must be covered by these revenues.

(2) a. At 5% interest, how much revenue will be needed (per acre) at the end of an 80-year rotation to offset this tax?
   \[ V_n = \frac{R(1+i)^n - 1}{i} = \frac{7[(1.05)^{80} - 1]}{0.05} = \$6,798.60 \]

(2) b. At 7% interest, how much revenue will be needed (per acre) at the end of an 80-year rotation to offset this tax?
   \[ V_n = \frac{R(1+i)^n - 1}{i} = \frac{7[(1.07)^{80} - 1]}{0.07} = \$22,323.44 \]

(2) c. At 5% interest, how much revenue will be needed (per acre) at the end of a 100-year rotation to offset this tax?
   \[ V_n = \frac{R(1+i)^n - 1}{i} = \frac{2.4[(1.05)^{100} - 1]}{0.05} = \$18,270.18 \]

(2) d. At 7% interest, how much revenue will be needed (per acre) at the end of a 100-year rotation to offset this tax?
   \[ V_n = \frac{R(1+i)^n - 1}{i} = \frac{2.4[(1.07)^{100} - 1]}{0.07} = \$86,671.63 \]
3. You are thinking about buying a pickup. The best interest rate you can get on a loan is 6% (annual percentage rate, or APR). You can afford a monthly payment of $350.00.

(2) a. What is the equivalent monthly interest rate. 
\[ i_m = (1 + i)^{\frac{1}{12}} - 1 = 1.06^{\frac{1}{12}} - 1 = 0.00486755 = 0.486755\% \]

(2) b. How much can you afford to pay for the pickup if you get a 3-yr loan?
\[
V_0 = \frac{R[(1 + i_m)^n - 1]}{i_m(1 + i_m)^n} = \frac{R[(100486755)^{36} - 1]}{0.00486755(100486755)^{36}} = $11,532.14
\]

(2) c. How much can you afford to pay for the pickup if you get a 5-yr loan?
\[
V_0 = \frac{R[(1 + i_m)^n - 1]}{i_m(1 + i_m)^n} = \frac{R[(100486755)^{60} - 1]}{0.00486755(100486755)^{60}} = $18,173.34
\]

(3) d. How much can you afford to pay for the pickup if you save $350 each month at 4% APR for 3 years before buying and then buy with cash?
\[ i_m = (1 + i)^{\frac{1}{12}} - 1 = 1.04^{\frac{1}{12}} - 1 = 0.00327374 = 0.327374\% \]
\[ V_n = \frac{R[(1 + i_m)^n - 1]}{i_m} = \frac{R[(100327374)^{36} - 1]}{0.00327374} = $13,349.38
\]

(2) 4. a. Using a 5% interest rate, find the present value of timber harvest income of $6,400 (per acre) that occurs every 100 years, starting 100 years from now.
\[ V_0 = \frac{R}{(1 + i)^n} = \frac{6,400}{(1.05)^{100}} = $49,042
\]

(3) b. What percentage of the present value calculated in part a comes from the first harvest and what percentage comes from the remaining harvests?

The amount of the present value that comes from the first harvest can be calculated using the single value formula:
\[ V_0 = \frac{R}{(1 + i)^n} = \frac{6,400}{(1.05)^{100}} = $48,669
\]

So, out of the $49,042 that is the present value of the infinite series, the first harvest accounts for $48,669, or 99.2%.

(2EC) c. Assume the timber stand in part a is already 60 years old. Find the present value of timber harvest income of $6,400 that occurs every 100 years, starting 40 years from now.

There are several ways to do this. The simplest is to compound the present value of the infinite series forward by 60 years:
\[ V_{60} = V_0(1 + i)^{60} = 49,042(1.05)^{60} = $916.06
\]

So, the value of the stand if it is 60 years old is $916.06 per acre. This is actually an example of the forest value, which we will study later.