Math 1130 Exam 3 Autumn 2012

1(a). (10 points) First solve the system of equations; if there are no solutions, or infinitely many solutions, state this.
Then, circle the most appropriate description of the graph: i.e the given lines intersect at a single point, or they are two different parallel lines, or they are the same line.

$$\left.\begin{aligned} 3x + 7y &= 8 \\ 2x + 5y &= 4 \end{aligned}\right\}$$

Circle one: intersecting parallel same line

(b). (8 points) A company has taxable income of $860,000. The federal tax is 28% of that portion left after the state tax has been paid.The state tax is 12% of that portion left after the federal tax has been paid.
Let x = the federal tax paid in dollars and
y = the state tax paid in dollars.

Set up, but **do not solve** a system of equations in x and y, whose solutions will give the federal and state taxes.

2. (16 points) The total revenue R and the total cost C equations for a certain item are given by:

$$R = q - 2$$

$$C = \sqrt{q+10}$$

where q is the quantity of units manufactured and sold, measured in thousands of units, and R and C are measured in thousands of dollars. Find the break-even quantity. (i.e. when R = C). (Include the appropriate units in your answer.)

Answer: 2_____

3.(a) (10 points) An individual makes deposits of $1500 at the end of every three months into an account paying 2.8% interest compounded quarterly for 8 years. How much is in the account at the end of 8 years?

Answer: 3(a)._____

(b). (16 points) A loan of $180,000 is amortized over 30 years at the rate of 6% compounded monthly.

Find (i) The monthly payment

(ii) The principal remaining after 6 years.

Answer 3(b) (i). Monthly payment = _____

(ii) Principal remaining after 6 years = _____

4. (16 points) Answer the following questions with the following sequence:

$$33, \quad 11, \quad \frac{11}{3}, \quad \frac{11}{9}, \quad \ldots\ldots\ldots\ldots$$

(a). Is the sequence arithmetic or geometric?

(b) Find the common difference(or ratio) of the sequence.

(c) Find the 12th term of the sequence.

(d) Find the sum of the first 12 terms of the sequence.

(Your answer must be presented as a fraction;
decimal approximations will recieve no credit. Show your work!)

5(a). (8 points) Let $A = \begin{bmatrix} -3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 6 & 4 \end{bmatrix}$.

Compute the following operations with the matrices A and B.

If it is not possible, say it is undefined.

(i) AB

(ii) A + B

(b).(10 points) Find x and k such that

$$\begin{bmatrix} x & 3 \\ 6 & 4 \end{bmatrix} + k\begin{bmatrix} 5 & 1 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -4 \\ -8 & -3 \end{bmatrix}$$

Answer 5(b). x = _____, k = _____

(c).(6 points) Write the following system of equations as a matrix equation AX = B:

$$2x - y = 1$$
$$5x + 3y = 7$$

Answer 5(c). A = _____, X = _____, B = _____

Answer 5: _____

Formulas

$$S = P(1+r)^n$$

$$P = S(1+r)^{-n}$$

$$r_e = (1+r)^n - 1$$

$$S = Pe^{rt}$$

$$P = Se^{-rt}$$

$$r_e = e^{r} - 1$$