Name (Print): _____

Username.#: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Math 1130
Autumn 2015
Exam 3 - Form A
12/3/15

This exam contains 10 pages (including this cover page) and 6 problems. Check to see if any pages are missing. The exam is worth 100 points. The value of each question is listed below.

The following rules apply:

- You have **55 Minutes** to complete this exam.
- You may **not** use your books or notes on this exam.
- Please write clearly.
- **Partial Credit**: You are required to show your work on each problem of this exam. Incorrect answers with supporting work may receive partial credit. Any questions without supporting work will receive no credit. Partial credit might not be awarded on some questions.
- Calculators are permitted with the exception of calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators (and their upgrades) are not permitted: TI-89, TI-92, and HP-49. In addition, neither PDAs, laptops, nor cell phones are permitted.
- Unless otherwise specified, make sure your answers are in **exact form** (i.e. not a decimal approximation).
- Please write your answers in the boxes provided unless otherwise instructed.
- A random sample of graded exams will be copied before being returned.

Question	Points	Score
1	10	
2	14	
3	26	
4	20	
5	16	
6	14	
Total:	100	

1. Circle the best answer to the following problems.

   (a) (3 points) What is the fifth term in the arithmetic sequence $5, 1, a_3, a_4, a_5, ...$?

   (i) -2 (ii) -5 (iii) -8 (iv) -11

   (b) (3 points) What is the fourth term in the geometric sequence $2, 6, b_3, b_4, b_5, ...$?

   (i) 12 (ii) 18 (iii) 24 (iv) 54

   (c) (4 points) Determine the value of the sum $\sum_{i=1}^{\infty} 4\left(\frac{1}{2}\right)^{i-1}$. Make sure you write the formula you use for this part!

   (i) 2 (ii) 4 (iii) 8 (iv) 16

2. Determine the indicated values for the following problems.

   (a) (6 points) The entries of a 2×3 matrix are given by the formula $A_{ij} = i + 2j$. Fill in the blanks in the matrix using the given formula.

$$\begin{pmatrix} \_\_\_\_\_ & \_\_\_\_\_ & \_\_\_\_\_ \\ \_\_\_\_\_ & \_\_\_\_\_ & \_\_\_\_\_ \end{pmatrix}$$

   (b) (8 points) Solve for $w, x, y,$ and z in the following matrices:

$$\begin{pmatrix} x+1 & 2 & y-1 \\ 3 & -4 & 7 \\ -2 & z+x & 1 \end{pmatrix} = \begin{pmatrix} 2 & 2 & -3 \\ 3 & w-z & 7 \\ -2 & 4 & 1 \end{pmatrix}$$

$w =$ $\boxed{}$

$x =$ $\boxed{}$

$y =$ $\boxed{}$

$z =$ $\boxed{}$

3. (a) (12 points) An individual makes deposits of $\$500$ at the end of every quarter into an account that pays 4.8% compounded quarterly. Determine the balance, S, of the account after ten years. Round to the nearest penny. Make sure to write down the formula that you use for your computations!

$S =$ ☐

(b) (8 points) A car loan of $\$32,000$ is amortized over five years at a rate of 3.6% compounded monthly. Determine the monthly payment, R, rounded to the nearest penny. Make sure to write down the formula that you use for your computations!

$R =$ ☐

(c) (6 points) In the same loan as part (b), determine the interest portion of the first payment. Give your answer to the nearest dollar.

Interest= ☐

4. (a) (10 points) Solve the given linear system of equations. Give your answer as an ordered pair with each number rounded to two decimal places.

$$\begin{cases} 2x + 3y &= 7 \\ -2x + 5y &= -3 \end{cases}$$

$(x, y) =$ ____

(b) (10 points) Solve the given nonlinear system of equations. Give your answer as an ordered pair with each fraction rounded to one decimal place. Make sure to give all solutions, and separate your ordered pairs with a comma.

$$\begin{cases} x^2 + y^2 &= 2 \\ 2x + y &= 3 \end{cases}$$

$(x, y) =$ ____

5. (a) (8 points) A manufacturer sells a product at $\$7.32$ per unit, selling all units produced. The fixed cost is $\$3205$, and the variable cost is $\$6.07$ per unit. At what level of production, q, will the break even point occur?

$q =$ _____

(b) (8 points) The supply and demand equations for a certain product are

$$\begin{cases} 4q - 200p + 1749 = 0 \\ 4q + 100p - 1749 = 0 \end{cases}$$

p is given in dollars. Determine the equilibrium price, p, to the nearest penny.

$p =$ _____

6. (a) (8 points) Given the matrices $A = \begin{pmatrix} 2 & 3 \\ -5 & -7 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 2 \\ -4 & 4 \end{pmatrix}$, compute $2A + 3B$

$$2A + 3B = \begin{pmatrix} \_\_\_\_\_ & \_\_\_\_\_ \\ \_\_\_\_\_ & \_\_\_\_\_ \end{pmatrix}$$

(b) (6 points) Determine A and B in the matrix equation $AX = B$, with A as the coefficient matrix of the system and $X = \begin{pmatrix} x \\ y \end{pmatrix}$

$$\begin{cases} 2x + 3y &= 7 \\ -2x + 5y &= -3 \end{cases}$$

$$A = \begin{pmatrix} \_\_\_\_\_ & \_\_\_\_\_ \\ \_\_\_\_\_ & \_\_\_\_\_ \end{pmatrix}$$

$$B = \begin{pmatrix} \_\_\_\_\_ \\ \_\_\_\_\_ \end{pmatrix}$$

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Some Useful Formulas

$$A = R \cdot \frac{1-(1+r)^{-n}}{r}$$

$$S = R \cdot \frac{(1+r)^{n}-1}{r}$$

$$R = A \cdot \frac{r}{1-(1+r)^{-n}}$$

$$\sum_{i=1}^{\infty} ar^{i-1} = \frac{a}{1-r}$$

$$\sum_{i=1}^{k} ar^{i-1} = \frac{a(1-r^{k})}{1-r}$$

Scrap work