Name:_____

# MATH 1050 - Exam 4 (Released) - 2012-13

- Neatly write your solutions directly on the exam paper. If a solution requires more space than given, you may continue on the back of the page. Work on scratch paper will not be graded.
- *To receive full credit you must show all necessary work and provide clear explanations.*
- Books, notes, calculators with symbolic manipulation features, computers, cell phones, or other internet enabled devices are not allowed.

1. Each of these problems is worth 3 points. NO justification is required for these problems.

   (a) State whether the equation $x^2 + 4y^2 - 8y = 0$ represents the equation of a circle, ellipse, parabola, or hyperbola.

   (b) For the matrices $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 3 & 4 \end{bmatrix}$, find $2A - B$, if possible.

   (c) Express the sum $4 + 2 + 1 + \frac{1}{2} + \frac{1}{4} + \cdots + 8\left(\frac{1}{2}\right)^n$ using summation notation. (Do not find the sum.)

   $$\sum$$

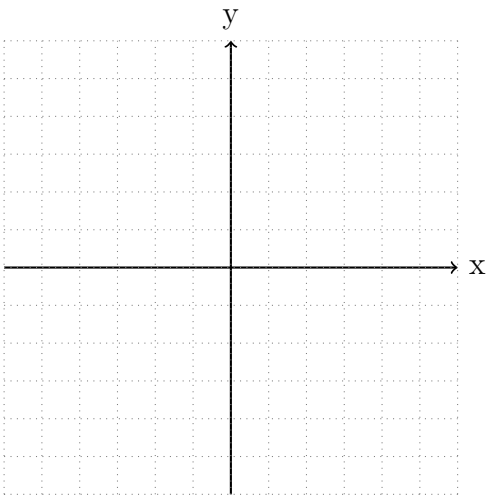
   (d) Find the first 3 terms of the geometric sequence with $r = \frac{1}{2}$ and $a_1 = 5$.

   (e) For the arithmetic sequence $100, 97, 94, 91, \ldots$, find $d$, the common difference.

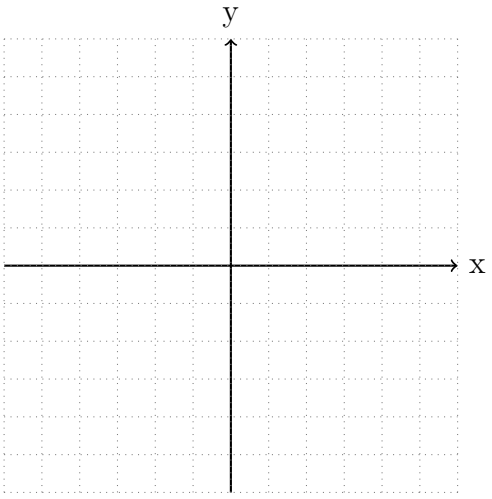
   (f) Find a formula for the $n^{th}$ term of the sequence $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6} \ldots$. Hint: this sequence is neither arithmetic nor geometric.

2. Write the hyperbola $2x^2 - y^2 - 4x - 6y = 11$ in standard form.

3. A parabola has a vertex at $(-2, 3)$ and a directrix at $x = 0$. Find the equation of the parabola. (You do not need to graph the parabola.)




4. Graph the ellipse $(x - 1)^2 + 4(y + 2)^2 = 16$. Label the center, vertices, and foci.



5. Find the first four terms of the sequence $\{a_n\}$ defined recursively by $a_1 = 2$, $a_n = na_{n-1} - 3$

6. If $\{a_n\}$ is an arithmetic sequence with $a_6 = 40$ and $a_{24} = 10$, find $d$, the common difference.

7. Find the formula for the $n^{th}$ term of the series $24, 12, 6, 3, \ldots$.

8. Find the sum $\sum_{k=1}^{20}(4k-2)$.

9. Determine whether the series $\sum_{k=1}^{\infty}\frac{(-1)^n}{5}$ converges of diverges. If it converges, find its sum.

10. Solve the system using elimination: $\left\{ \begin{array}{rcrcrl} -x & + & y & - & 5z & = -15 \\ x & + & 3y & + & z & = -1 \\ & & y & - & z & = -4 \end{array} \right\}$

11. The matrix $\left[ \begin{array}{cccc} 1 & 2 & 1 & 5 \\ 0 & 1 & 3 & 3 \\ 0 & 0 & 1 & 4 \end{array} \right]$ represents an augmented matrix for a linear system. Write the corresponding set of linear equations.

12. Determine whether Cramer's rule can be used to solve the linear system:

$$\left\{ \begin{array}{rcrcrl} 3x & - & 6y & - & z & = 24 \\ -2x & + & 5y & + & 3z & = -19 \\ x & - & y & + & z & = 10 \end{array} \right\}$$

If it can't be used, explain why not. If Cramer's rule can be used, use Cramer's rule to solve for $z$. You may use a calculator to find determinants, but must show all other work.

13. Solve the linear system $\left\{ \begin{array}{rcrcl} 3x & - & 6y & = & 12 \\ -2x & + & 5y & = & -9 \end{array} \right\}$ using the following method:

(a) Write the linear system as a matrix equation $A\mathbf{X} = \mathbf{B}$.

(b) Find $A^{-1}$ using any method *AND* use the inverse matrix to solve the matrix equation for $\mathbf{X}$.

14. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & -1 \end{bmatrix}$. Show all work.