Math 1050 Final Exam College Algebra
Fall Semester 2014
Form A

Instructor_____Name_____
Student ID_____ID Verification_____Section Number _____

Time Limit: 120 minutes
All problems are weighted equally.
No graphing calculators, notes, books, cell phones, or any devices that can connect to the Internet are allowed.
Scientific calculators with no more than a basic numeric store and recall memory are allowed on the final exam. Reference formulas that are allowed are attached to the exam.

This exam has two parts:
Part I - Ten multiple choice questions - answer all
Part II - Fifteen open ended questions - answer all

INSTRUCTIONS PART I: Questions 1 - 10, Multiple Choice. Answer all TEN questions. Circle the correct answer. It is not necessary to show work. There will be no partial credit awarded on this part of the exam.
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1) Determine whether the infinite geometric series converges or diverges. If it converges, find its sum.

$18 + 6 + 2 + \frac{2}{3} + \ldots$

A) Converges; 26 B) Converges; 27 C) Converges; - 9 D) Diverges

2) This matrix is nonsingular. Find the inverse of the matrix.

$$\begin{bmatrix} 2 & 5 \\ 1 & -5 \end{bmatrix}$$

A) $\begin{bmatrix} -\frac{1}{3} & -\frac{1}{3} \\ -\frac{1}{15} & \frac{2}{15} \end{bmatrix}$

B) $\begin{bmatrix} \frac{2}{15} & \frac{1}{3} \\ \frac{1}{15} & -\frac{1}{3} \end{bmatrix}$

C) $\begin{bmatrix} \frac{1}{3} & -\frac{1}{3} \\ \frac{1}{15} & \frac{2}{15} \end{bmatrix}$

D) $\begin{bmatrix} \frac{1}{3} & \frac{1}{3} \\ \frac{1}{15} & -\frac{2}{15} \end{bmatrix}$

3) List the potential rational zeros of the polynomial function.

$f(x) = -2x^3 + 3x^2 - 4x + 8$

A) $\pm \frac{1}{2}, \pm 1, \pm 2, \pm 4$

B) $\pm \frac{1}{8}, \pm \frac{1}{4}, \pm \frac{1}{2}, \pm 1, \pm 2, \pm 4, \pm 8$

C) $\pm \frac{1}{4}, \pm \frac{1}{2}, \pm 1, \pm 2, \pm 4, \pm 8$

D) $\pm \frac{1}{2}, \pm 1, \pm 2, \pm 4, \pm 8$

4) Express as a single logarithm.

$2\log_4 x + 5\log_4 (x - 3)$

A) $10 \log_4 x(x - 3)$

B) $\log_4 x(x - 3)^{10}$

C) $\log_4 x(x - 3)$

D) $\log_4 x^2(x - 3)^5$

5) Determine whether the function is even, odd, or neither.

$f(x) = \frac{x}{x^2 + 2}$

A) even

B) odd

C) neither

6) Put the ellipse in standard form and identify the center.

$3x^2 + 5y^2 - 36x + 40y + 173 = 0$

A) $\frac{(x - 6)^2}{5} + \frac{(y + 4)^2}{3} = 1$

center: (6, -4)

B) $\frac{(x - 6)^2}{5} + \frac{(y + 4)^2}{3} = 1$

center: (-6, 4)

C) $\frac{(x + 6)^2}{5} + \frac{(y - 4)^2}{3} = 1$

center: (6, -4)

D) $\frac{(x + 6)^2}{5} + \frac{(y - 4)^2}{3} = 1$

center: (-6, 4)

7) Find the function that is finally graphed after the following transformations are applied to the graph of $y = \sqrt{x}$. The graph is shifted down 5 units, reflected about the x-axis, and finally shifted left 9 units.

A) $y = -\sqrt{x + 9} - 5$ B) $y = -\sqrt{x - 9} + 5$ C) $y = \sqrt{-x - 9} - 5$ D) $y = -\sqrt{x + 9} + 5$

8) For the given functions f and g, find the requested composite function.

$f(x) = 3x + 7$, $g(x) = -2/x$; Find $(g \circ f)(3)$.

A) $\frac{46}{3}$ B) 5 C) $-\frac{1}{8}$ D) $-\frac{32}{3}$

9) The owner of a video store has determined that the cost C, in dollars, of operating the store is approximately given by $C(x) = 2x^2 - 30x + 770$, where x is the number of videos rented daily. Find the lowest cost to the nearest dollar.

A) \$658 B) \$545 C) \$320 D) \$883

10) Solve the inequality.

$x^3 - 4x^2 - 12x > 0$

A) $(-\infty,-2) \cup (0, 6)$ B) $(-2, 0) \cup (6, \infty)$ C) $(-6, 0) \cup (2, \infty)$ D) $(-2, \infty)$

INSTRUCTIONS PART II: Questions 11 - 25. Answer all FIFTEEN questions carefully and completely showing all appropriate work and clearly indicating your answer.

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11) Find the amount that results from the investment.

$1,000 invested at 8% compounded semiannually after a period of 12 years

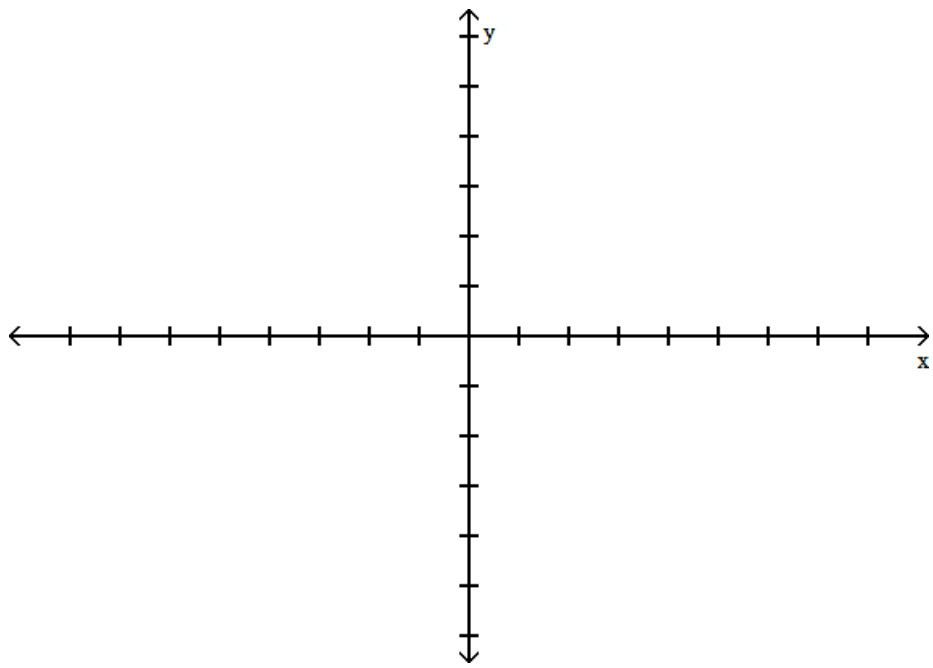
12) Find the domain of the function.

$$f(x) = \frac{x}{\sqrt{x - 6}}$$

13) Graph the polynomial. Identify each x-intercept and whether the graph crosses or touches the x-axis at each x intercept.

$f(x) = x^3 - 4x^2 - 12x$

x-intercept	cross/touch



14) Find the real solutions of the equation.

$x^{1/2} - 8x^{1/4} + 12 = 0$

15) Expand the expression.

$(4x + 3)^4$

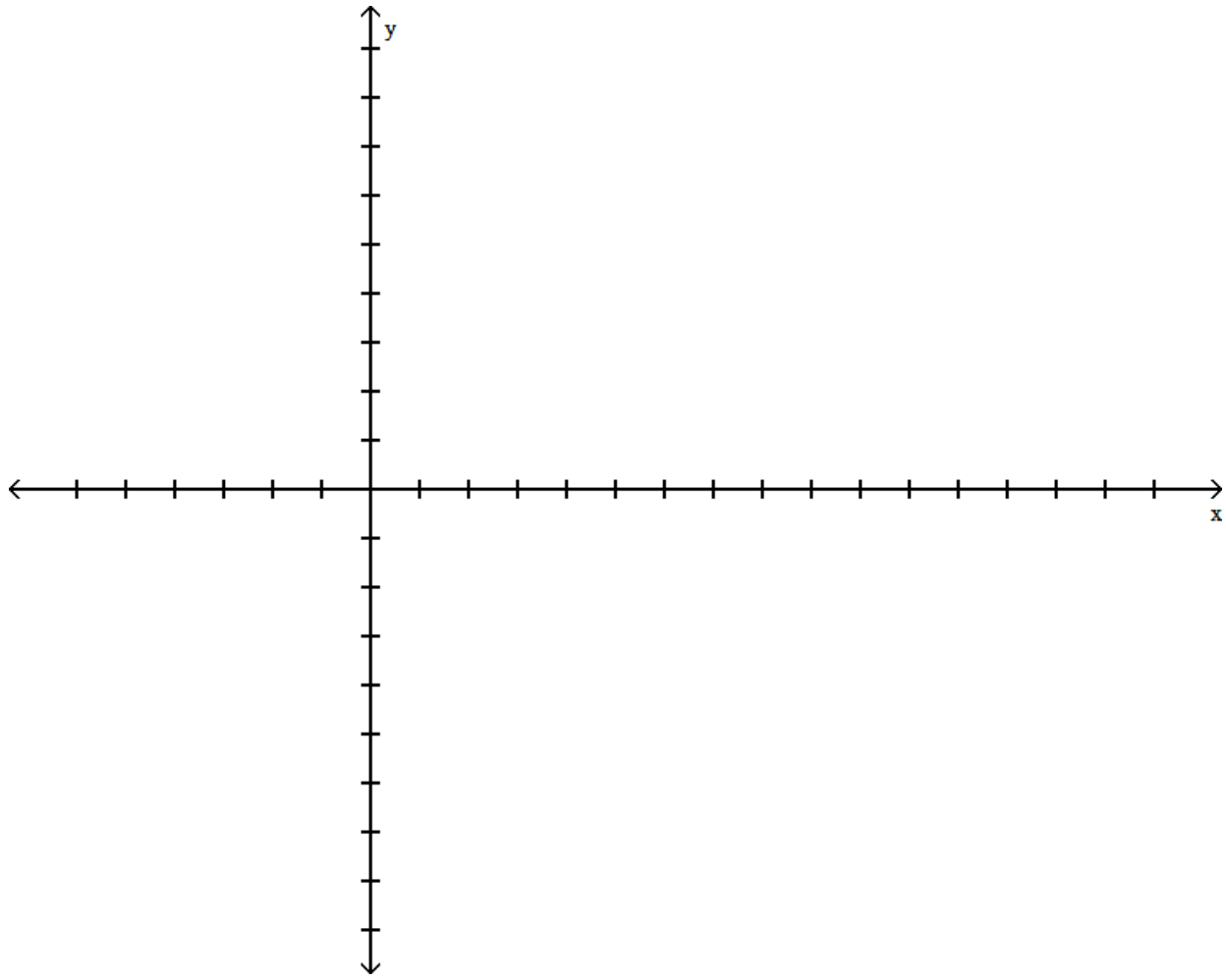
16) Find the twenty-second term of the arithmetic sequence $-1, 4, 9, ...$

17) Form a polynomial f(x) with real coefficients having the given degree and zeros.

Degree 3: zeros: 1 + i and -6

18) Graph the function. Label or list at least three points on the graph.

$$f(x) = \begin{cases} 3 & \text{if } -2 \le x < 1 \\ |x| & \text{if } 1 \le x < 4 \\ \sqrt{x} & \text{if } 4 \le x \le 9 \end{cases}$$



19) Solve the system of equations using Cramer's Rule.

$$\begin{cases} 5x + 6y = 8 \\ 4x + y = -5 \end{cases}$$

20) Write the partial fraction decomposition of the rational expression.

$$\frac{5x - 22}{(x + 4)(x - 3)}$$

21) Graph the function. Determine the domain, x and y intercepts, any vertical, horizontal, and/or oblique asymptotes. Label or list at least three points on the graph.

$$f(x) = \frac{x^2 + 4x - 5}{(x - 4)^2}$$

Domain:

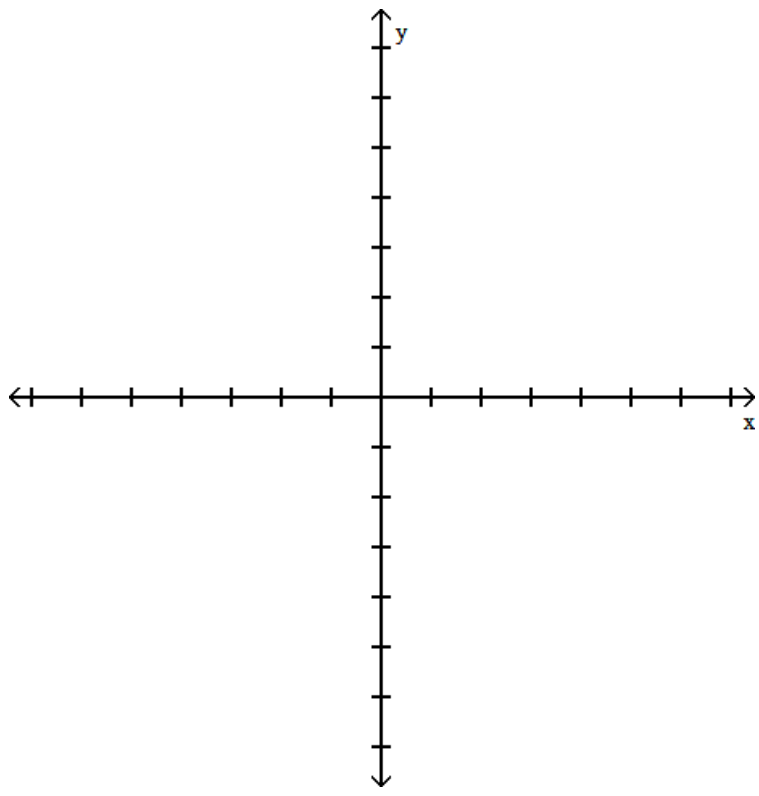
x - intercepts:

y - intercept:

Vertical Asymptote(s):

Horizontal Asymptote(s):

Oblique Asymptote(s):



22) Solve the equation.

$\log_3 (x + 5) + \log_3 (x - 1) = 3$

23) The size P(t) of a small herbivore population at time t (in years) obeys the function $P(t) = 700e^{0.12t}$ if they have enough food and the predator population stays constant. After how many years will the population reach 2800? Round your answer to the nearest year.

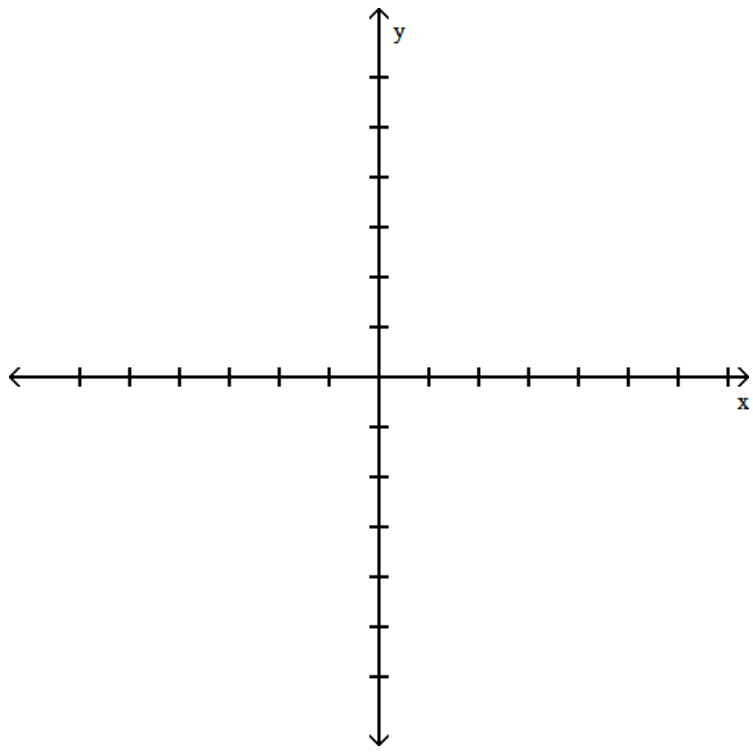
24) Graph the function. Determine the domain, range, and horizontal asymptote of the function. Label or list at least three points on the graph.

$f(x) = 2^{-x} + 3$

Domain:

Range:

Horizontal Asymptote(s):



25) A brick staircase has a total of 13 steps. The bottom step requires 105 bricks. Each successive step requires 4 less bricks than the prior one. How many bricks are required to build the staircase?