Math 1050 Final Exam form E - Fall Semester 2006

Name _____ Instructor _____

Student ID _____, ID Verification _____ Section Number _____

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This exam has three parts: Part I - Ten multiple choice questions
Part II - Ten open ended questions - you **MUST** show all your work
Part III - Choose FIVE out of ten open ended questions - you **MUST** show your work and indicate which five problems are to be graded

Students are **NOT** allowed to use books or notes.

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PART I: Questions 1 - 10, Multiple choice
Answer all TEN questions and circle the correct answer.

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Find the domain of the function.

1) $h(x) = \dfrac{x - 4}{x^3 - 49x}$

A) $\{x|x \neq -7, 0, 7\}$ B) $\{x|x \neq 4\}$

C) $\{x|x \neq 0\}$ D) all real numbers

Solve the equation.

2) Find all the reall solutions of the following equation.
$\log_3 x + \log_3 (x - 8) = 2$

A) 9 B) 3 C) -1, 9 D) 1, -9

Find the function that is a result of using the following transformations which are applied to the graph of $y = \sqrt{x}$.

3) i) Shift up 3 units
ii) Reflect about the y-axis
iii) Shift left 5 units

A) $y = -\sqrt{x + 5} + 3$ B) $y = \sqrt{-x - 5} - 3$

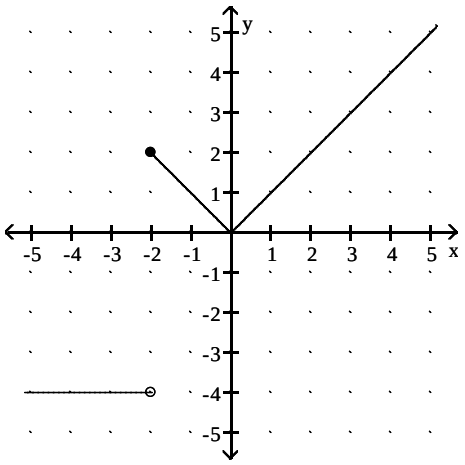
C) $y = \sqrt{-x - 5} + 3$ D) $y = \sqrt{-x + 5} - 3$

Graph the function.

4)

$$f(x) = \begin{cases} |x| & \text{if } x < 2 \\ -4 & \text{if } x \geq 2 \end{cases}$$

A)



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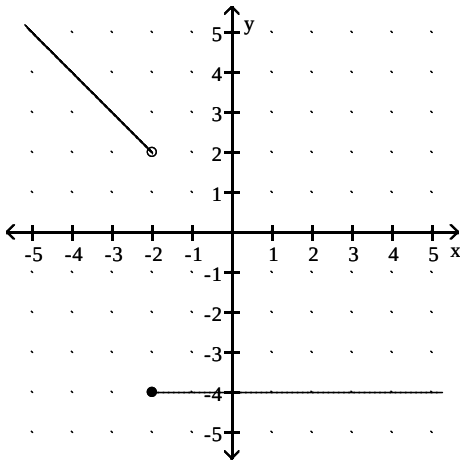

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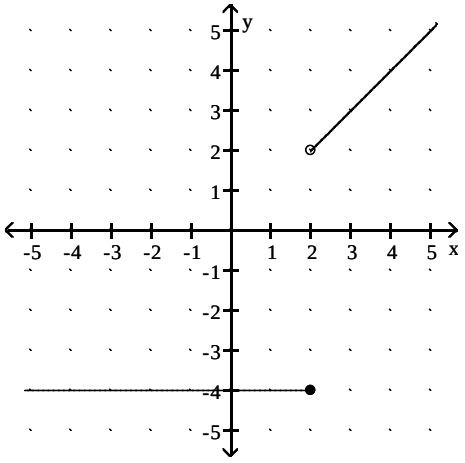
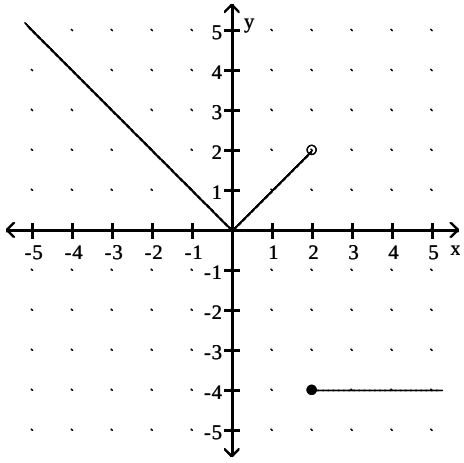


D)



Solve the system of equations for x.

5)

$$\begin{cases} 3x + 2y + z = 14 \\ 2x - 2y - z = -9 \\ 4x + y + 5z = 23 \end{cases}$$

A) x = 1 B) x = 3 C) x = 4 D) inconsistent

Find the first term, the common difference for the arithmetic sequence.

6) 7th term is 59; 15th term is 43

A) $a_1 = 71,\ d = 2$ B) $a_1 = 71,\ d = -2$

C) $a_1 = 73,\ d = 2$ D) $a_1 = 73,\ d = -2$

List the potential rational zeros of the polynomial function. Do not find the zeros.

7) $f(x) = 5x^3 - x^2 + 3$

A) $\pm\frac{1}{3}, \pm\frac{5}{3}, \pm 1, \pm 5$ B) $\pm\frac{1}{5}, \pm\frac{3}{5}, \pm 1, \pm 3$

C) $\pm\frac{1}{5}, \pm\frac{3}{5}, \pm 1, \pm 3, \pm 5$ D) $\pm\frac{1}{5}, \pm\frac{1}{3}, \pm 1, \pm 3, \pm 5$

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

8) $f(x) = \frac{x}{x^2 - 3}$

A) even B) odd C) neither

Solve the problem.

9) The size P of a small herbivore population at time t (in years) obeys the function $P(t) = 1000e^{0.2t}$ (if they have enough food and the predator population stays constant). After how many years will the population reach 3000?

A) 10.49 yrs B) 14.98 yrs C) 5.49 yrs D) 38 yrs

Compute the product.

10)

$$\begin{bmatrix} 0 & -3 & 1 \\ 5 & -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 1 & -1 \end{bmatrix}$$

A) $\begin{bmatrix} 1 & 5 \\ -4 & 9 \end{bmatrix}$ B) $\begin{bmatrix} 1 & -4 \\ 5 & 5 \end{bmatrix}$ C) $\begin{bmatrix} 1 & 5 \\ 9 & -4 \end{bmatrix}$ D) $\begin{bmatrix} 1 & -4 \\ 5 & 9 \end{bmatrix}$

Answer Key
Testname: MATH 1050 FALL 2006 FINAL EXAM FORM E PART 1

1) A
2) A
3) C
4) D
5) A
6) B
7) B
8) B
9) C
10) D

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PART II: Questions 11 - 20, Open ended

Answer all TEN questions. You must show all your work in a clear and logical progression and clearly indicate your answer to receive full credit.

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State the domain and range of f(x). Find $f^{-1}(x)$.

11) $f(x) = \dfrac{3x - 2}{x + 5}$

domain of f(x): _____ range of f(x):_____

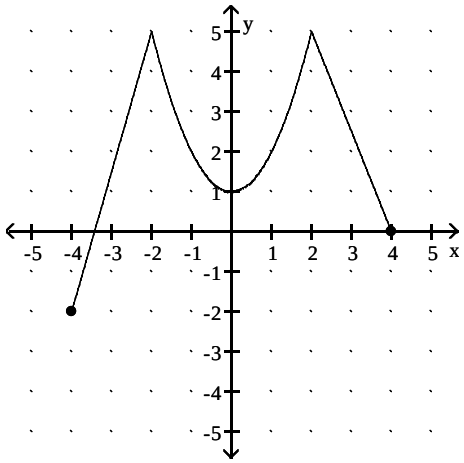
$f^{-1}(x) =$ _____

Solve the inequality.

12) $x(x + 3)(5 - x) \geq 0$

Use the graph of the function f(x) to answer the following questions.

13) f(x)



a) Find f(-2)

b) For what value(s) of x is f(x) = -2 ?

c) What is the domain of f(x)?

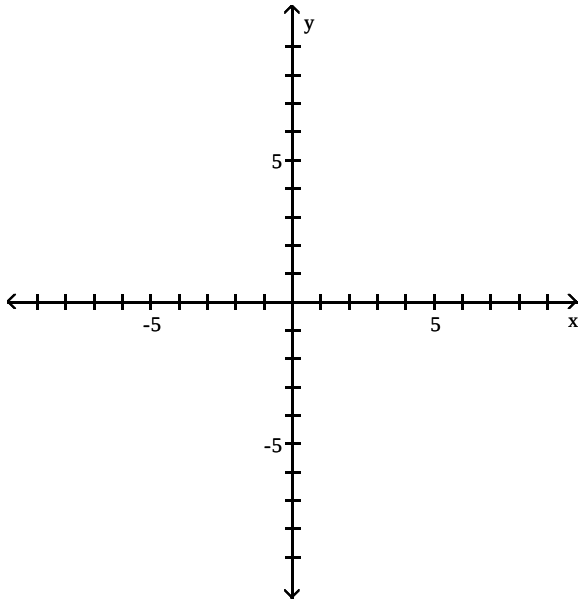
d) On what interval(s) is f(x) increasing?

Write as the sum and/or difference of logs. Express powers as factors.

14) $\ln\left(\frac{(x)\sqrt[7]{1+5x}}{(x-7)^5}\right)$, $x > 7$

Graph the function. Include any asymptotes and intercepts if applicable.

15) $f(x) = \frac{x}{x^2 - 9}$

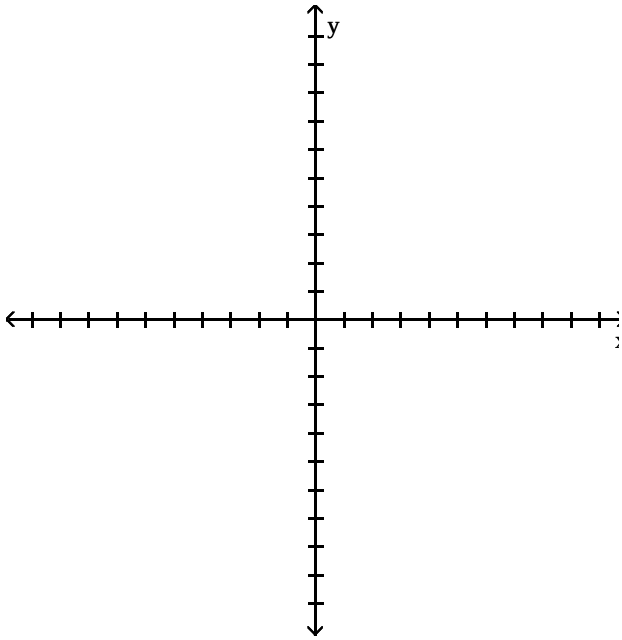


Solve the problem.

16) A wire of length 5x is bent into the shape of a square. Express the area A of the square as a function of x.

Write an equation for the ellipse satisfying the given conditions. Graph the ellipse.

17) Vertices at (5, -4) and (5, 8); length of minor axis is 6



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

18) Degree: 3; zeros: 1 and 3 + i.

Solve the problem.

19) Given the polynomial function $f(x) = (x - 2)^3(x - 3)^2(x - 4)$

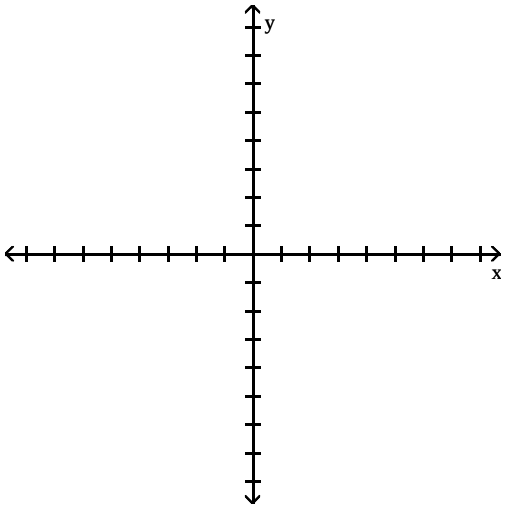
The power function is: _____

The y-intercept is: _____

In the table below, list each zero and its multiplicity.

Zero:	Multiplicity:	Touch/Cross:

Use this information to sketch a graph of the function.



Solve by hand.

20)

$$\begin{vmatrix} 5 & -4 & -1 \\ -2 & 2 & 0 \\ -1 & -2 & 8 \end{vmatrix}$$

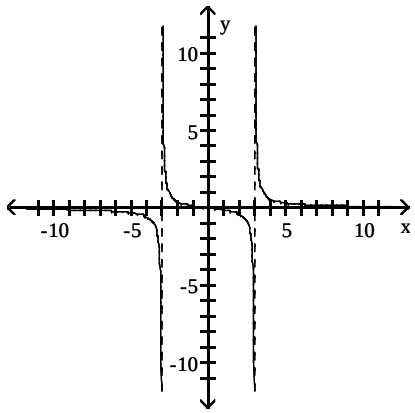
11) $f^{-1}(x) = \frac{5x + 2}{3 - x}$; domain of f: $\{x \mid x \neq -5\}$; range of f: $\{y \mid y \neq 3\}$

12) $(-\infty, -3]$ or $[0, 5]$

13) a) 5 b)x = -4 c) [-4, 4] d) $(-4, -2) \cup (0. 2)$

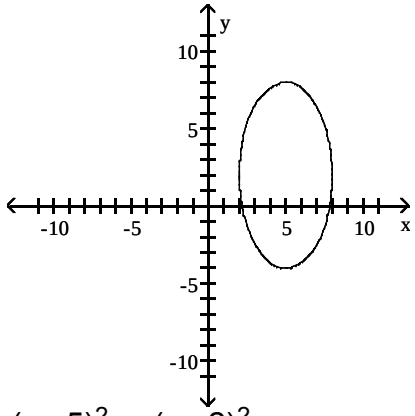
14) $\ln x + \frac{1}{7}\ln (1 + 5x) - 5 \ln (x - 7)$

15)



16) $A(x) = \frac{25}{16}x^2$

17)



$\frac{(x - 5)^2}{9} + \frac{(y - 2)^2}{36} = 1$

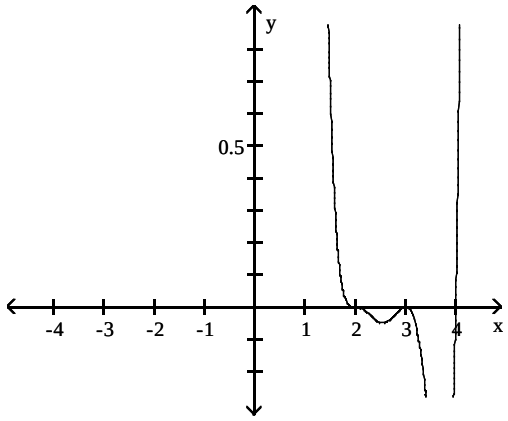
18) $f(x) = x^3 - 7x^2 + 16x - 10$

19) The power function is: x^6

The y-intercept is: 288

In the table below, list each zero and its multiplicity.

Zero:	Multiplicity:	Touch/Cross:
2	3	Cross
3	2	Touch
4	1	Cross



20) 10

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PART III: Questions 21 - 30, Self select

Choose **FIVE** out of the next TEN questions to complete. **You must show all your work and clearly indicate your answer for full credit.** CROSS OUT the problems that you do not want graded.

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Find the inverse of the matrix without using your calculator.

21)
$$\begin{bmatrix} -2 & 2 \\ -6 & 1 \end{bmatrix}$$

Write the partial fraction decomposition of the rational expression.

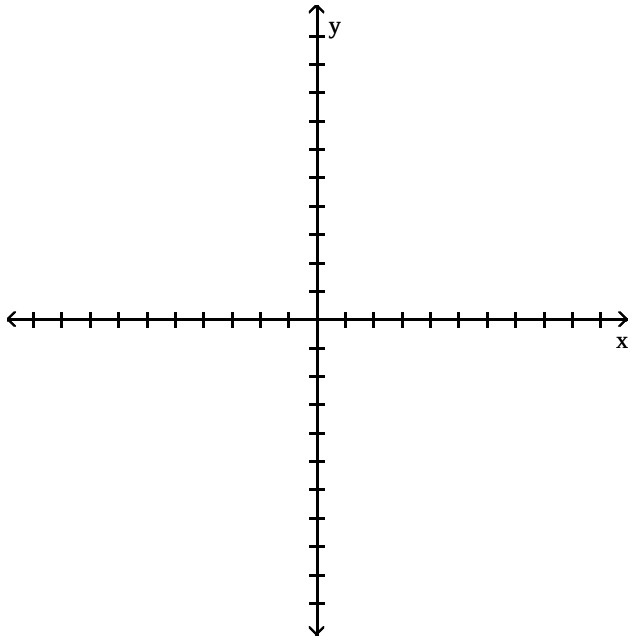
22) $\dfrac{x}{(x - 6)(x - 7)}$

Use synthetic division and the Factor theorem to determine whether x - c is a factor of f(x).

23) $f(x) = x^3 + 4x^2 - 10x + 12; \quad x + 6$

Find the center (h, k) and radius r of the circle. Graph the circle.

24) $x^2 + y^2 - 2x - 12y + 21 = 0$



Solve the problem.

25) Find the amount earned at the end of 4 years if $6000 is invested at a rate of 8.5% compounded monthly.

The sequence is defined recursively. Write the first four terms.

26) $a_1 = 3$ and $a_n = 4a_{n-1} - 2$ for $n \geq 2$

Find the sum of the infinite geometric series.

27) $\sum_{k=1}^{\infty} 2\left(\frac{1}{3}\right)^{k-1}$

Solve the equation. Give BOTH the <u>exact solution</u> and the <u>approximate solution</u> to the nearest hundredth.

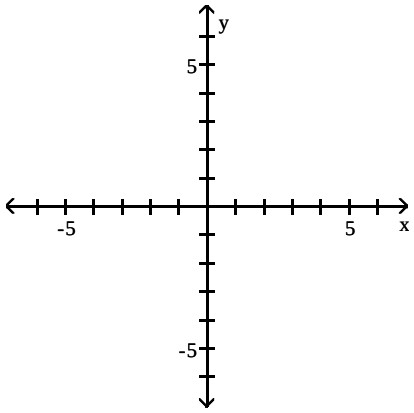
28) $2^{(2x)} = 3^{(x+1)}$

Find the real solutions of the equation.

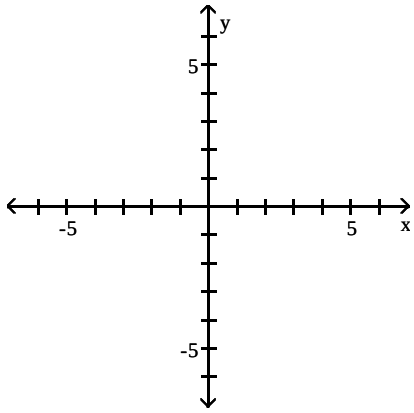
29) $x - 9x^{1/2} + 20 = 0$

Graph BOTH functions below. For each function <u>list at least three ordered pairs</u> that lie on the graph.

30) $f(x) = \log_3 x$



$g(x) = 3^x$

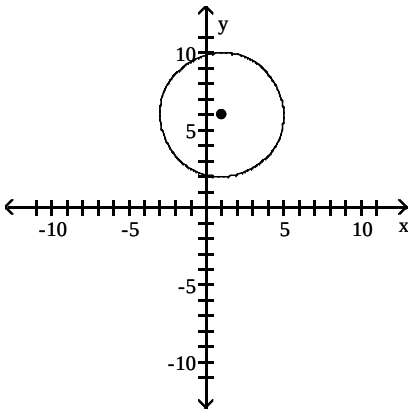


21) $\begin{bmatrix} \frac{1}{10} - \frac{1}{5} \\ \frac{3}{5} - \frac{1}{5} \end{bmatrix}$

22) $\frac{-6}{x-6} + \frac{7}{x-7}$

23) Yes

24) (h, k) = (1, 6); r = 4



25) $8419.59

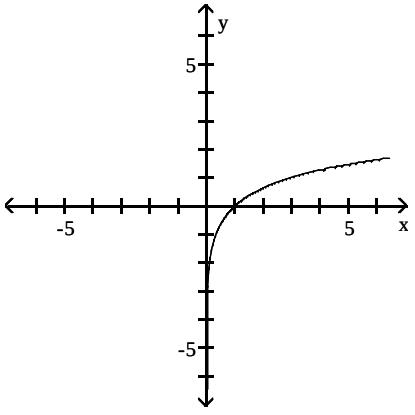
26) 3, 10, 38, 150

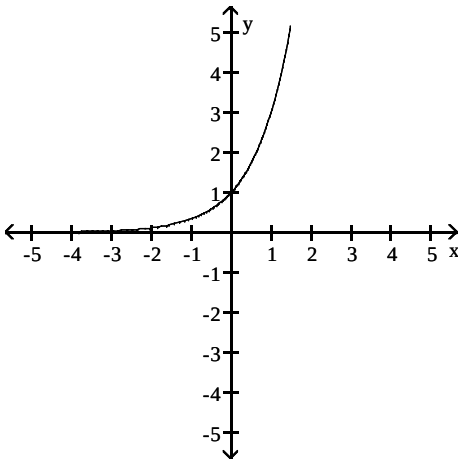
27) 3

28) Exact answers may vary. $x = \frac{\ln 3}{2\ln 2 - \ln 3}$, $x \approx 3.82$

29) {16, 25}

30)





f(1/3) = -1, f(1) = 0, f(3) = 1, etc.
g(-1) = 1/3 , g(0) = 1 , g(1) = 3 , etc.