Math 103 Exam 3 MLC Practice Exam

Name:_____ Section: _____ Date: _____

Signature: _____

Do not start this test until your instructor says so. You will have exactly **50 minutes** from this time to finish the test. Please **show all work in the space provided.**

There are 16 questions on 7 pages. Without fully opening the exam, please check to make sure your exam is complete before you begin. **Please read instructions carefully**.

1. You will need a pencil or pen, one calculator and this exam paper. Please clear everything else from your desk. (Please turn off or switch cell phones to manner mode and place in backpack – NOT on your person.)

2. Calculators such as the TI89, TI-NSPIRE, Voyage 200, TI92, TI92+, HP49G, HP49G+, HP50G, Casio algefx2.0, algefx2.0pls or laptop, handheld, desktop and palmtop computers are NOT to be used. The use of cell phones, PDAs, 'Blackberries', 'head sets', or any other wireless device in the classroom is specifically prohibited. **Please do not ask your instructor/proctors about calculator use or mode.** You must clear all programs from your calculator memory. **Calculators cannot be shared.**

3. Please look at overhead/board for possible corrections to this exam.

4. Do not spend too much time on a particular problem. Work the problems that are simplest for you first.

5. There is no partial credit on the multiple choice or true/false questions. On the open-ended questions, the grading will be based on your method. **SHOW ALL OF YOUR WORK. NO WORK = NO CREDIT! DO NOT SKIP STEPS!** You must show all work that supports your answer in order to get credit. Be neat and orderly. If you need additional space, use the back of the exam pages.

6. Circle the letter of the correct answer for multiple choice or true/false questions. For open-ended questions, place your work and answers in the space provided. Answers can be in any form unless otherwise specified. For problems asking for EXACT answers, leave in terms of fractions, π and $\sqrt{number}$. No credit will be given for decimal approximations when an **EXACT** answer is required. When solving equations, please put your answer in solution set form. For decimal answers, **round to 4 decimal places** unless otherwise specified.

7. Give measurement units (feet, degrees, etc.) when appropriate.

8. SIMPLIFY ALL ANSWERS as much as possible.

1. (10 points) Given the function $f(x) = -(x+8)^2 + 9$, find

(a) the coordinates of the vertex.

(b) the equation for the axis of symmetry.

(c) the x-intercept(s).

(d) the y-intercept(s).

(e) the domain and range of f.

(a)

(b)

(c)

(d)

(e) Domain:

Range:

10	

2. (6 points) Given $f(x) = \begin{cases} x^2, & \text{if } x < -2 \\ 2x+1, & \text{if } -2 \le x < 7 \\ \sqrt{x-6}, & \text{if } 7 \le x \end{cases}$.

Evaluate $f(-5) - [f(-2)]^2 + 3f(10)$.

6	

3. (10 points) A farmer has several animals that he wants to hold in separate pens. He has 660 feet of fence and wants to construct 5 pens as shown in the figure below. Find the dimensions that maximize the enclosed area and also the maximum area that can be enclosed.

Length:
Width:
Maximum Area:

10	

4. (12 points) Use the graph of $f(x)=\frac{1}{x^2}$ to graph $g(x)=\frac{1}{(x+1)^2}-3$ (including asymptotes). Then complete or find each of the following for function *g*:

Equations of the Asymptotes: _____ _____

Domain: _____

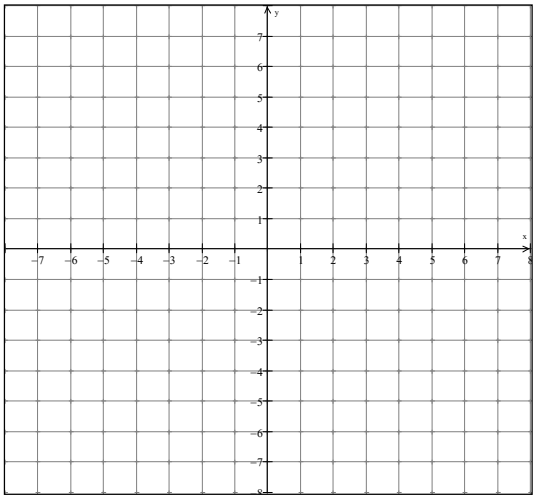
Range: _____

As $x \to -1^+, g(x) \to$ _____

As $x \to -1^-, g(x) \to$ _____

As $x \to -\infty, g(x) \to$ _____

As $x \to \infty, g(x) \to$ _____



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5. (10 points) Given $f(x)=\dfrac{4}{x^2-9}$ and $g(x)=\sqrt{x}$.

(a) Find $(f\circ g)(x)$ and simplify your answer. Then find the domain of $f\circ g$ using interval notation.

$(f\circ g)(x)=$

Domain of $f\circ g$:

(b) Evaluate $(f\circ g)(5)$.

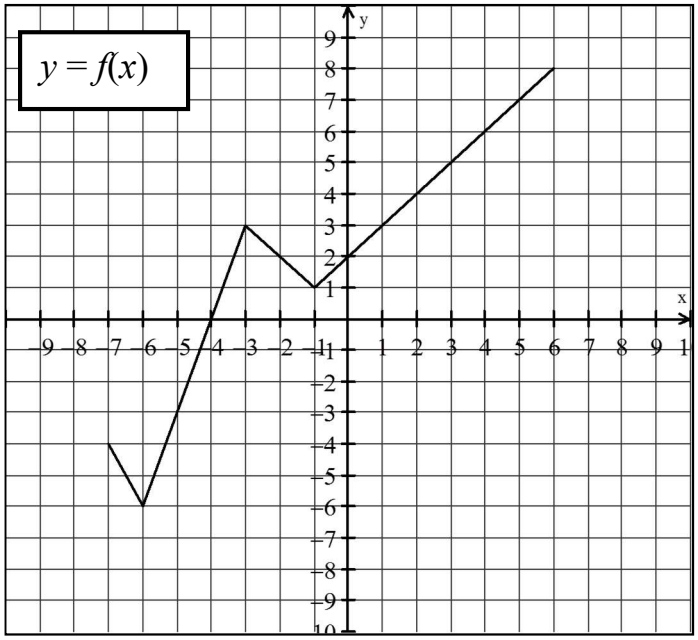
10	

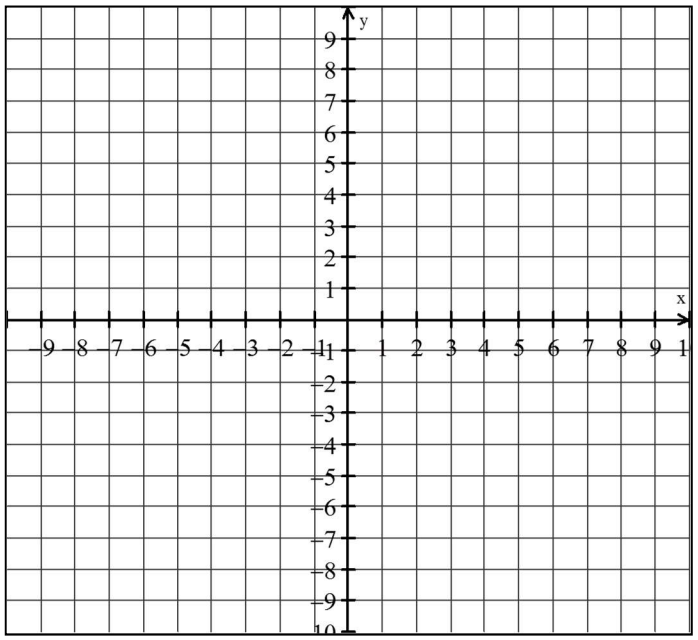
6. (10 points) Given $f(x)=\dfrac{5x-3}{x+2}$, find the inverse function, $f^{-1}(x)$.

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

10	

7. (10 points) Given the graph of f at the left below. Sketch the graph of $g(x) = \frac{1}{2} f(-x-4) - 3$ on the grid on the right and clearly indicate the coordinates of five different points on your graph. To receive full credit, you must show your intermediate steps using tables or graphs.





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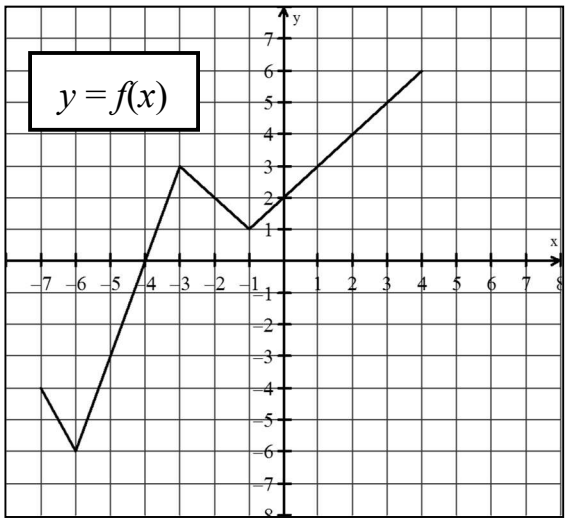
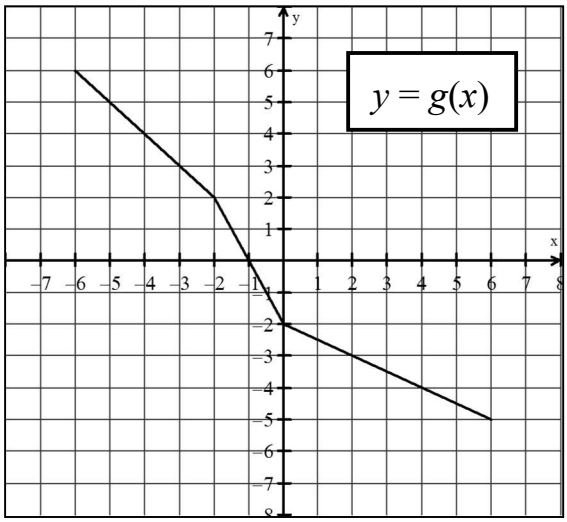
8. (16 points) Refer to the graphs of f and g below to answer questions (a) – (h). Use **interval notation** where applicable.





(a) Find $(f \circ g)(0)$.

(b) Evaluate $g^{-1}(4)$.

(c) Evaluate $(f \cdot g)(-2)$.

(d) State the range of f.

(e) Which function is a one-to-one function?

(f) Is the function g even, odd, or neither?

(g) For what value(s) of x is $f(x) = 3$?

(h) Find the domain of $f - g$.

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True or False: (2 points each)

9. **T** **F** The polynomial $p(x) = (x-1)(x+3)(x^2-4)$ intercepts the *y*-axis at 12.

10. **T** **F** The graph of $f(x) = ax^4 - 3x^3 + 6$ (where a > 0) rises left and right.

11. **T** **F** $f(x) = \dfrac{5x^2}{x+3}$ describes a polynomial function.

12. **T** **F** The graph of $f(x) = \dfrac{3x^3+5}{3x+5}$ has no horizontal asymptote.

13. **T** **F** If $f(7) = 8$, then $f^{-1}(8) = 7$.

14. **T** **F** If $f(x) = -f(x)$, then the graph of f reflects over the *x*-axis.

15. **T** **F** The degree of the polynomial $p(x) = (x-1)^2(x^2-4)$ is 2.

16. **T** **F** The domain of $f(x) = \dfrac{\sqrt{x}}{x}$ is $(0, \infty)$.

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Problem #	1	2	3	4	5	6	7	8	9-16	Total
Points Earned										
Possible	10	6	10	12	10	10	10	16	16	100