

Math 150                    **NEATLY PRINT NAME:** \_\_\_\_\_

Exam 2    **STUDENT ID:** \_\_\_\_\_

Spring 2009                                    **DATE:** \_\_\_\_\_

Scarborough            **SECTION:**    **501** T 3:55-4:45    **503** T 2:20-3:10    **504** R 2:20-3:10 3    **505** T 8:00-8:50

TEST NO.: **SPRING**

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

\_\_\_\_\_  
Signature of student

Academic Integrity Task Force, 2004  
<http://www.tamu.edu/aggiehonor/FinalTaskForceReport.pdf>

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor's office hours to pick up my exam.

Signature of student \_\_\_\_\_

***NO CALCULATORS ALLOWED!***

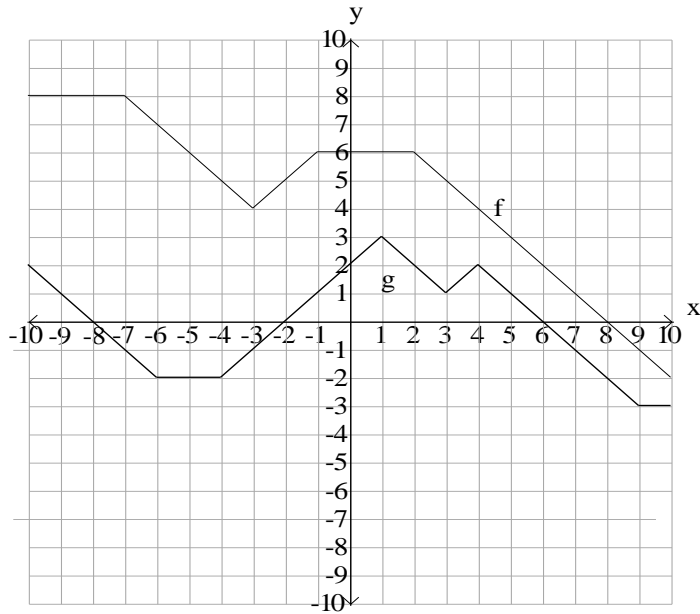
**This is a 10-question multiple-choice exam; there is no partial credit. Each problem is worth 5 points for a total of 50 points. There will be a 2-point bonus if you have no transgressions. Transgressions include not having the correct Scantron form 882E, not filling out your Scantron form correctly, having a folded or mutilated Scantron, having your cell phone ring or vibrate, not having your TAMU student ID, not following directions, not turning in your exam and Scantron on time (you must be finished filling in your Scantron and exam cover before time is called). *The Scantron will not be returned so also mark all your answers on this test paper.***

**SCANTRON:** Please double check to make sure you have completed your Scantron correctly, as shown below.

**Name:** print your name neatly  
**Subject:** Math 150  
**Date:** March 2009

**Test No.:** *SPRING*  
**Period:** your section number

**For the next 3 problems:** Use the given graphs of  $f$  and  $g$ , with  $f$  being the top graph and  $g$  being the bottom graph.



1. Evaluate  $(g \circ f)(1) + (f \circ g)(-3)$ .

- a. 14
- b. None of these
- c. undefined
- d. 6
- e. 7

2. Evaluate  $(fg)(2) + (f - g)(4)$ .

- a. undefined
- b. 14
- c. 2
- d. None of these
- e. 8

3. If  $h(x) = g(-x) + 2$ , evaluate  $h(1)$ .

- a. None of these
- b. 1
- c. -2
- d. undefined
- e. 3

4. Given  $f(x) = \begin{cases} \frac{1}{x^2} - 2, & \text{for } x < -1 \\ 5, & \text{for } 0 \leq x < 4 \\ 3 - \sqrt{4 + x^2}, & \text{for } x \geq 4 \end{cases}$ .

Evaluate  $f(-2)$  and,  $f(4)$  respectively.

- a.  $\frac{-7}{4}, 3 - 2\sqrt{5}$
- b.  $\frac{-9}{4}, 3 - 2\sqrt{5}$
- c. None of these
- d.  $\frac{-7}{4}, 5$
- e.  $\frac{1}{4}, 5$

5. If  $f(x) = -2x^2 - 12x - 13$ , which of these is true?

- a. The vertex is  $(-3, 5)$ , and it has a vertical stretch of  $-2$ .
- b. The vertex is  $(-3, 22)$ , and it has a vertical stretch of  $-2$ .
- c. The vertex is  $(-3, -1)$ , and it has a vertical stretch of  $2$ .
- d. The vertex is  $(-3, 5)$ , and it has a vertical stretch of  $2$ .
- e. The vertex is  $(-3, -31)$ , and it has a vertical stretch of  $2$ .

6. What is the domain of  $f(x) = \frac{x-1}{\sqrt{-x^2-5x+24}}$ ?

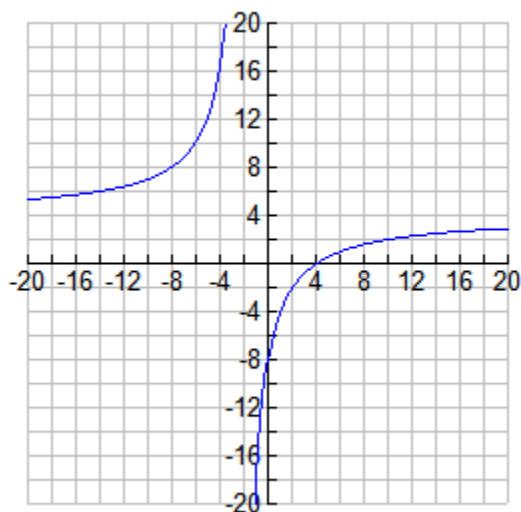
- a.  $[-8, 3]$
- b.  $(-8, 1) \cup (1, 3)$
- c.  $(-8, 3)$
- d.  $(-\infty, -8) \cup (3, \infty)$
- e. None of these

7. Let  $f(x) = (x+5)(x-2)^2(x+7)^3$ . Determine the behavior of the graph of  $f(x)$  around each of its roots.
- None of these
  - $f(x)$  is positive on the intervals  $(-\infty, -7)$  and  $(-5, \infty)$ , and negative on the interval  $(-7, -5)$ .
  - $f(x)$  is negative on the intervals  $(-\infty, -7)$ ,  $(-5, 2)$ , and  $(2, \infty)$ , and positive on the interval  $(-7, -5)$ .
  - $f(x)$  is negative on the intervals  $(-\infty, -7)$  and  $(-5, 2)$ , and positive on the intervals  $(-7, -5)$  and  $(2, \infty)$ .
  - $f(x)$  is positive on the intervals  $(-\infty, -7)$ ,  $(-5, 2)$ , and  $(2, \infty)$ , and negative on the interval  $(-7, -5)$ .
8. If  $f(x) = \frac{3}{x-4}$ , what is the horizontal asymptote of  $f$  and what is its inverse function, respectively?
- None of these
  - No horizontal asymptote;  $f^{-1}(x) = \frac{x-4}{3}$  with domain  $(-\infty, \infty)$
  - $y = 3$ ;  $f^{-1}(x) = \frac{4x+3}{x}$  with domain  $(-\infty, 0) \cup (0, \infty)$
  - $y = 0$ ;  $f^{-1}(x) = \frac{7}{x}$  with domain  $(-\infty, 0) \cup (0, \infty)$
  - $y = 0$ ;  $f^{-1}(x) = \frac{4x+3}{x}$  with domain  $(-\infty, 0) \cup (0, \infty)$

9. Find *all* the rational roots of  $f(x) = 2x^3 - 11x^2 + 16x - 7$ .

- a.  $-1$  of multiplicity of two,  $\frac{-7}{2}$
- b.  $\frac{1}{2}$ ,  $1$ ,  $\frac{7}{2}$ ,  $7$
- c. None of these
- d.  $1$  of multiplicity of two,  $\frac{7}{2}$
- e.  $\frac{1}{2}$ ,  $1$ ,  $7$

10. What is the equation of the given rational function?



- a.  $f(x) = \frac{4(x-4)}{x+2}$
- b.  $f(x) = \frac{4(x+2)}{x-4}$
- c.  $f(x) = \frac{4(x-4)^2}{(x+2)^2}$
- d.  $f(x) = \frac{4(x+2)}{x-1}$
- e.  $f(x) = \frac{4(x-4)}{x-2}$



1. If  $f(x) = 2x^2 - 8$ , evaluate and fully simplify the difference quotient.
2. A marble thrown upward with an initial velocity of 32 feet per second will reach a height of  $h$  feet after  $t$  seconds such that  $h(t) = -16t^2 + 32t$ . Algebraically determine when the marble reaches a height of 15 feet. Remember your units.
3. Find all of the asymptotes of  $r(x) = \frac{x^3 - 7x^2 - 16x + 112}{x^2 - 2x - 8}$ .

4. If  $f(x) = x^2 - 25$  and  $g(x) = \frac{2}{\sqrt{x}}$ , find and simplify  $(f \circ g)(x)$ , and its domain in interval notation.

$(f \circ g)(x) =$  \_\_\_\_\_ Domain: \_\_\_\_\_

5. How much water (0% saline solution) must be added to 3.4 ml of 32% saline solution to obtain a 20% saline solution?

6. Describe the end behavior of  $f(x) = -4x^{25} - 7x^{10} + x - 8$ .

7. Give a polynomial  $p(x)$  that has roots at  $-2$  and  $8$  such that the graph of the polynomial crosses the  $x$ -axis at  $-2$  and touches the  $x$ -axis at  $8$ . Leave your polynomial as a product of factors!

8. Find all the *possible* rational roots of  $p(x) = -2x^{20} - 7x^{10} + x - 10$ .

9. Algebraically prove or disprove  $f(x) = 3x - 5$  is a one-to-one function.

Circle one:    **ONE-TO-ONE**        **NOT ONE-TO-ONE**

10. Sketch a polynomial that is increasing on the intervals  $(-\infty, -5]$  and  $[5, \infty)$ , decreasing on the interval  $[-5, 5]$ , has a  $y$ -intercept of  $3$ , and has  $x$ -intercepts of  $-8$ ,  $2$  and  $8$ .

