MATH 1300: Calculus I, Spring 2008
MIDTERM EXAM 2

March 5, 2008

YOUR NAME:

001	N. Flores ..... (8am)	**009**	R. Krieger ..... (2pm)
002	A. Angel ..... (9am)	**011**	R. Grover ..... (10am)
003	D. Ernst ..... (9am)	**012**	I. Mishev ..... (12pm)
004	M. Formichella ..... (10am)	**013**	R. Chestnut ..... (1pm)
005	I. Becker ..... (11am)	**014**	I. Becker ..... (1pm)
006	D. Vernerey ..... (11am)	**015**	D. McCarl ..... (3pm)
007	J. Harper ..... (12pm)	**017**	N. Flores ..... (10am)
008	L. Harris ..... (2pm)		

Problem 0: Circle your CORRECT section above (3 points)

After you get the test back, if you consider that something was incorrectly graded,
DO NOT WRITE ON YOUR TEST!
As clearly as possible write down your version of the story on a clean sheet of paper, attach it to your test, and give it back to your instructor for further consideration.

problem	points	score
0–above	3 pts	
1	9 pts	
2	12 pts	
3	16 pts	
4	36 pts	
5	10 pts	
6	6 pts	
7	8 pts	
TOTAL	100 pts	

"On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance on this work."

SIGNATURE:

INSTRUCTIONS: Answer each of the following questions. In order to receive full credit on the *non-multiple choice* questions your answer must be **complete**, **legible**, and **correct**. You must also **show all of your work** and give adequate explanations on the *non-multiple choice* questions. No partial credit will be given on the multiple choice questions. No calculators, no books, no notes are allowed on this exam.

1. Stanley drives from Boulder to Pancake, Colorado, which is a small town on the way to the Kansas-Colorado border. For the first hour of his trip Stanley averages 45 miles per hour; Stanley then averages 60 miles per hour for the remaining 90 miles of his trip.

   (a) (3 points) How far did Stanley drive?

   (b) (3 points) How long did Stanley drive?

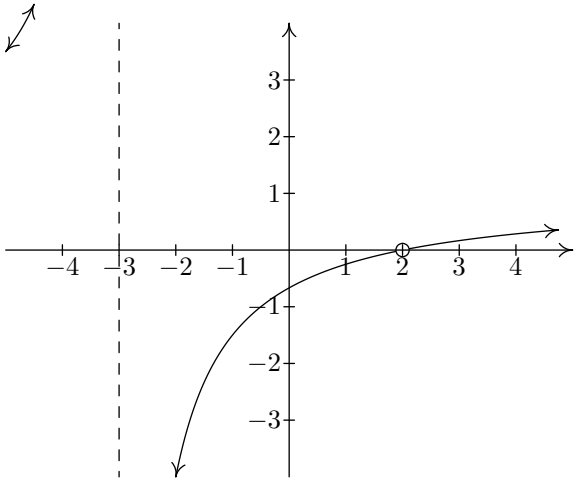
   (c) (3 points) What was Stanley's average velocity?

2. (4 points each) Match each function with the correct graph. (Note that there are more graphs than functions.)

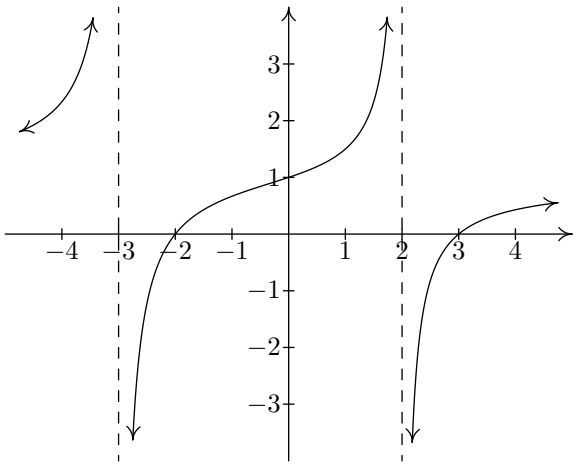
(a) $f(x) = \dfrac{x^2 - x - 6}{(x-2)(x+3)}$ Graph: _____

(b) $g(x) = \dfrac{x^2 - 4x + 4}{(x-2)(x+3)}$ Graph: _____

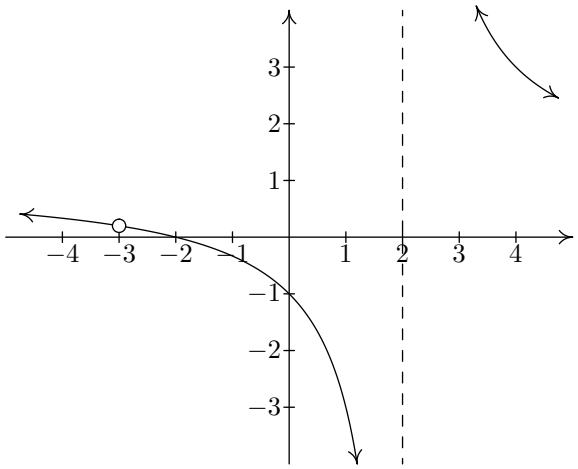
(c) $h(x) = \dfrac{x^2 + x - 6}{(x-2)(x+3)}$ Graph: _____



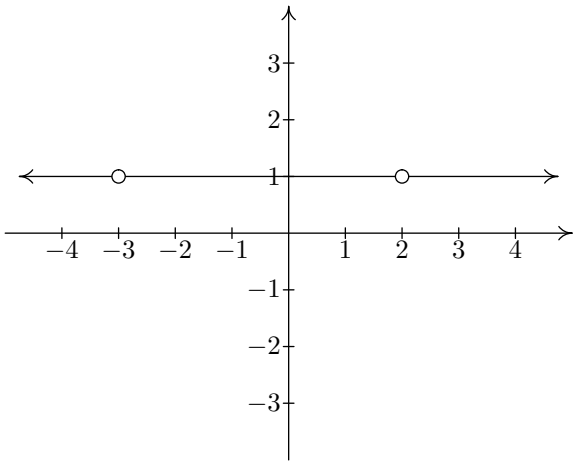
Graph A



Graph B

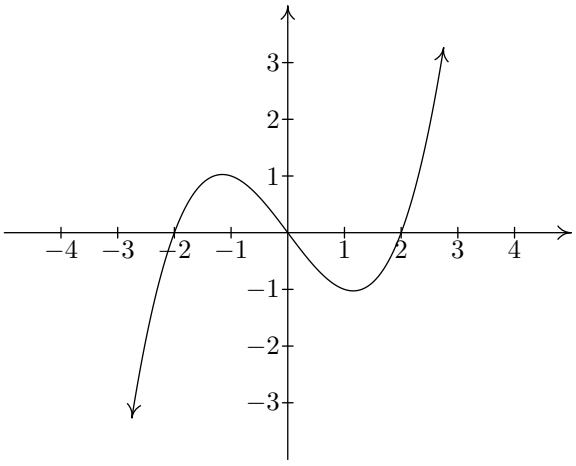


Graph C

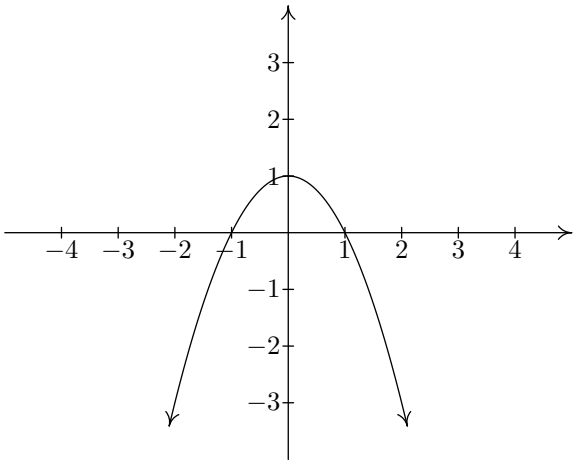


Graph D

3. (4 points each) Using the graphs below, circle the correct, or approximate, value for each of the following expressions.



Graph of f



Graph of g

(a) $g(1)$

A. 0 B. $-\frac{3}{2}$ C. -1 D. 1

(b) $f'(0)$

A. 0 B. $\frac{1}{2}$ C. -1 D. 1

(c) Suppose $h(x) = f(g(x))$. Then $h'(1) =$

A. 0 B. -2 C. -1 D. 2

(d) At how many points does $f'(x) = 0$?

A. 0 B. 1 C. 2 D. 3

4. (4 points each) Circle the correct answer for each of the following problems.

(a) Let $f(x) = \sqrt{1-x^2}$. Then $f'(x) =$

A. $\dfrac{-x}{\sqrt{1-x^2}}$ B. $-2x\sqrt{1-x^2}$ C. $\dfrac{1}{\sqrt{1-x^2}}$ D. $\dfrac{x}{\sqrt{1-x^2}}$

(b) Let $g(x) = \sin^{-1}(x)$. Then $g'(x) =$

A. $\dfrac{1}{x^2+1}$ B. $-\cos^{-1}(x)$ C. $\dfrac{1}{\sqrt{1-x^2}}$ D. $\dfrac{1}{\sin^2(x)}$

(c) Let $h(x) = e^{x^2}$. Then $h'(x) =$

A. e^{x^2} B. $2e^{x^2}$ C. $x^2e^{x^2}$ D. $2xe^{x^2}$

(d) Let $g(x) = \tan^2(x)$. Then $g'(x) =$

A. $\dfrac{2\sin(x)}{\cos^3(x)}$ B. $\sec^4(x)$ C. $2\sec^2(x)$ D. $2\tan(x)$

(e) Let $h(x) = \dfrac{x-1}{x+1}$. Then $h'(x) =$

A. $\dfrac{x-1}{(x+1)^2}$ B. $\dfrac{2}{(x+1)^2}$ C. $\dfrac{x}{(x+1)^2}$ D. $\dfrac{2x}{(x+1)^2}$

(f) Let $f(x) = xe^x$. Then $f''(x) =$

A. xe^x B. $xe^x + e^x$ C. x^2e^x D. $xe^x + 2e^x$

(g) Suppose $xy + y^2 = x$. Then $\dfrac{dy}{dx} =$

A. $\dfrac{1-y}{x+2y}$ B. $\dfrac{1}{\sqrt{x-xy}}$ C. $\dfrac{x-y}{x+2y}$ D. $\dfrac{1}{x+y}$

(h) $\lim\limits_{x\to\infty} \ln(x^{1/x}) =$

A. 0 B. 1 C. e D. Does not exist

(i) $\cos\left(\sin^{-1}\left(\frac{1}{3}\right)\right) =$

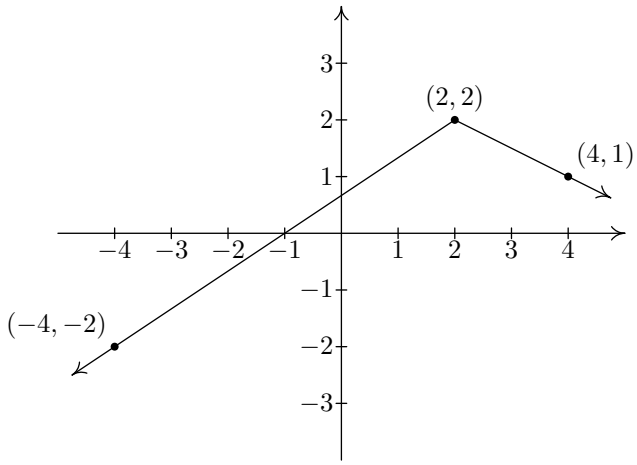
A. $\cot\left(\frac{1}{3}\right)$ B. $\cos^{-1}(\frac{1}{3})$ C. $\dfrac{2}{3}\sqrt{2}$ D. $\dfrac{2}{3}$

5. A 20 foot ladder is leaning against a wall, with its base 12 feet from the wall, so the top of the ladder is 16 feet from the ground. The base of the ladder begins to slide away from the wall at the rate of $\frac{4}{3}$ feet per second.

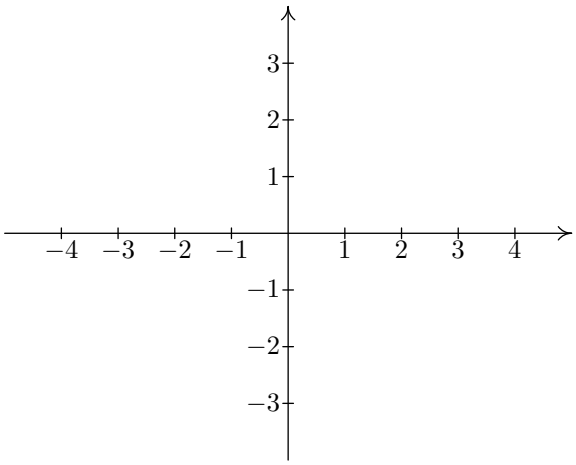
   (a) (4 points) What is the AVERAGE rate of change of the height of the ladder from its initial position until it hits the ground?

   (b) (6 points) When the base of the ladder is 16 feet from the wall, how fast is the top of the ladder sliding down the wall?

6. (6 points) Below is the graph of a function. Graph its derivative on the coordinate axes provided.



Graph of f



Graph of f'

7. (8 points) Find the coordinates of all points on the graph of $y = x^2$ at which the tangent line passes through the point $(1, 0)$.