

## Math 75A Practice Midterm I

§§2-A – 4-C (Ebersole), 1.1-1.5 (Stewart), **W1**

**DISCLAIMER.** This collection of practice problems is *not* guaranteed to be identical, in length or content, to the actual exam. You may expect to see problems on the test that are not exactly like problems you have seen before.

On the actual exam you will have more room to work the problems. You will see directions similar to these:

1. Please read directions carefully. Raise your hand if you are not sure what a problem is asking.
2. *You must explain your work thoroughly and unambiguously to receive full credit on questions or parts of questions designated as **Work and Answer**.*
3. **No calculators or notes are allowed on this exam.**
4. You have 65 minutes to complete your test, unless announced otherwise. Do not spend too long on any one problem. You do not have to do the problems in order. Do the easy ones first. Do not attempt the bonus question until you have completed the rest of the test. Before turning in your test, please make sure you have answered and double-checked all the questions.
5. If you need scratch paper, please raise your hand. You may not use your own paper. When you have finished your exam, please turn in any scratch paper you use.
6. Write your solutions in the space provided for each problem, or provide specific instructions as to where your work is to be found. *Make it clear what you want and don't want graded.* Your final answers should be boxed or circled.
7. Don't stress! I'm rooting for you!

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**Multiple Choice.** *Circle the letter of the best answer.*

1. A description for the function  $f(x) = \sqrt{3x} + 2$  is
  - (a) Take 3 times a number and then add 2
  - (b) Take 3 times a number, add 2, and then take the square root of the result
  - (c) Take 3 times a number, take the square root of the result, then add 2
  - (d) Take  $\sqrt{3}$  times a number and then add 2
2. The range of the function  $g(x) = -x^2 + 6x + 5$  is
  - (a)  $\mathbb{R}$  (all real numbers)
  - (b)  $[14, \infty)$
  - (c)  $[-\infty, 14)$
  - (d)  $(-\infty, 14]$

3. If the distance of a train from a station at time  $t$  minutes is  $s(t) = 30 - t^2$  meters, then the average velocity of the train during the second minute is

- (a) 6 meters per minute
- (b) 3 meters per minute
- (c) 4 meters per minute
- (d) 26 meters per minute

4. At  $x = 1$  the graph of  $f(x) = \frac{x - 1}{x^2 - 4x + 3}$

- (a) is continuous
- (b) has a hole
- (c) has a vertical asymptote
- (d) has none of the above

5. At  $x = -2$  the graph of  $f(x) = \frac{|x + 2|}{x + 2}$

- (a) is a horizontal line at  $y = 1$
- (b) has a hole
- (c) has a vertical asymptote
- (d) has none of the above

6. At  $x = -1$  the graph of  $f(x) = \frac{|x + 2|}{x + 2}$

- (a) is a horizontal line at  $y = 1$
- (b) has a hole
- (c) has a vertical asymptote
- (d) has none of the above

7. For  $f(x) = 4x^5 - \pi x^3 + \frac{x}{\sqrt{6}}$  and  $g(x) = 5x^3 - \frac{4}{x} + 2$ , which are polynomial functions?

- (a)  $f(x)$  only
- (b)  $g(x)$  only
- (c) both  $f(x)$  and  $g(x)$
- (d) neither  $f(x)$  nor  $g(x)$

8. The zeros of the function  $f(t) = 5t^2 + 13t - 6$  are

- (a) 5 and 13
- (b)  $\frac{2}{5}$  and  $-3$
- (c)  $-2$  and  $\frac{3}{2}$
- (d)  $\frac{1}{2}$  and  $-6$

9. The function  $s(t) = \frac{t^2 - 9}{t + 3}$

- (a) is continuous at  $t = -3$
- (b) is not continuous at  $t = -3$ .

10. Suppose  $f(x)$  is a function such that  $\lim_{x \rightarrow 1} f(x) = 2$ . Which of the following is *always* true of  $f(x)$ ?

- (a)  $f(x)$  is continuous at  $x = 1$
- (b)  $f(1) = 2$
- (c)  $f(x)$  is continuous on the intervals  $(0, 1)$  and  $(1, 2)$
- (d) None of these.

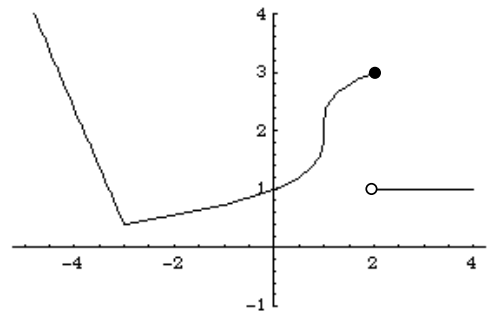
**Fill-In.**

1. If  $f(x) = 3x - 5$  and  $g(x) = x^3$ , then

- (a)  $(g \circ f)(1) = \underline{\hspace{2cm}}$
- (b)  $(g - f)(0) = \underline{\hspace{2cm}}$
- (c)  $(f \circ f)(2) = \underline{\hspace{2cm}}$
- (d)  $(f \circ g)(-1) = \underline{\hspace{2cm}}$

2.  $\lim_{x \rightarrow 5} \frac{x - 5}{x^2 - 12x + 35} = \underline{\hspace{2cm}}$

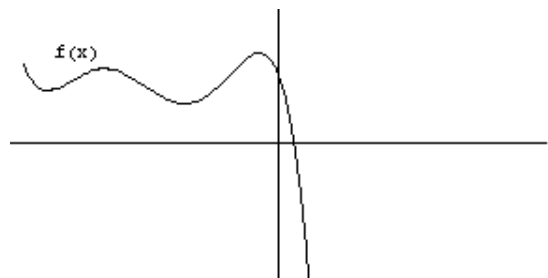
3. Use the graph of  $g(t)$  shown at right to answer parts (3a) and (3b). For each question, list **all** the  $t$ -values or largest intervals that make the sentence true.



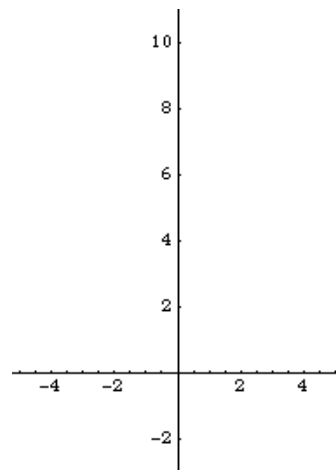
- (a) The value(s) of  $t$  at which  $g(t)$  is not continuous is/are  $\underline{\hspace{2cm}}$ .
- (b) The interval(s) on which  $g(t)$  is continuous is/are  $\underline{\hspace{2cm}}$ .

**Graphs.**

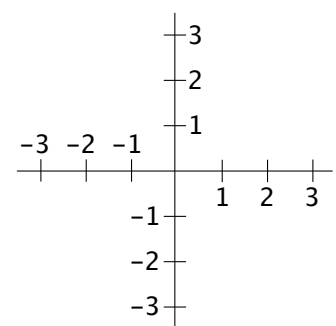
1. The graph of  $f(x)$  is shown at right. On the same axes, sketch the graph of  $f(-x)$ .



2. On the axes at right, sketch the graph of  $h(x) = 2|x - 1| + 3$ .

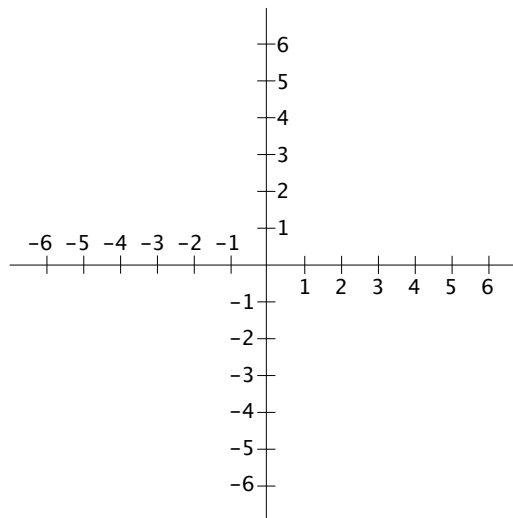


3. On the axes at right, sketch a graph of  $g(t) = \frac{t^2 - t - 2}{t - 2}$ .



4. On the axes at right, sketch a graph of any function  $f(x)$  satisfying all of the following:

- $\lim_{x \rightarrow 3^-} f(x) = 2$
- $\lim_{x \rightarrow 3^+} f(x) = -1$
- $f(3) = 4$
- $\lim_{x \rightarrow -2} f(x) = 0$
- $\lim_{x \rightarrow 0} f(x)$  does not exist



**Work and Answer.** *You must show all relevant work to receive full credit.*

1. Write  $f(x) = \frac{|3x - 6|}{x - 2}$  as a piecewise function and graph the function. What is the domain of  $f(x)$ ?

2. Find the domain of the function  $g(x) = \frac{3\sqrt{x}}{4x - 1}$ . *Express your answer in interval notation.*

3. Compute  $\lim_{x \rightarrow 0^-} \frac{|x| - x}{x}$ . If the limit does not exist, explain why.

4. Find the domain of the function  $f(x) = \sqrt[20]{-x^2 - 3x + 4}$ . *Express your answer in interval notation.*

Some kind of **BONUS**.