

Name: \_\_\_\_\_ PID: \_\_\_\_\_

TA: \_\_\_\_\_ Sec. No: \_\_\_\_\_ Sec. Time: \_\_\_\_\_

**Math 10A.**  
**Midterm Exam 1**  
**October 20, 2009**

*Turn off and put away your cell phone.*

*You may use one page of notes, but no books or other assistance during this exam.*

*You may leave answers in symbolic form, for example  $\sqrt{42}$  or  $\ln(6)$ .*

*Read each question carefully, and answer each question completely.*

*Show all of your work; no credit will be given for unsupported answers.*

*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

*If any question is not clear, ask for clarification.*

| #                          | Points | Score |
|----------------------------|--------|-------|
| <b>1</b>                   | 6      |       |
| <b>2</b>                   | 6      |       |
| <b>3</b>                   | 6      |       |
| <b>4</b>                   | 6      |       |
| <b><math>\Sigma</math></b> | 24     |       |

1. (6 points) For parts (a)-(e), use the following tables of values of the functions  $f$  and  $g$ .

| $x$ | $f(x)$ |
|-----|--------|
| -4  | 4      |
| -2  | 1      |
| 0   | -2     |
| 2   | -5     |
| 4   | -8     |

| $x$ | $g(x)$ |
|-----|--------|
| 0   | -6     |
| 1   | -2     |
| 2   | 0      |
| 3   | 2      |
| 4   | 5      |

(a) Find  $g(f(-4))$

(b) Find  $f(0)g(0)$

(c) Find  $f^{-1}(g(1))$

(d) Find  $g(g^{-1}(2))$

(e) One of the functions  $f$  and  $g$  is a linear function and the other is not. Find a formula for the linear function.

2. (6 points) You have 150 grams of a radioactive substance which decays exponentially. Each year the amount of the substance is reduced by 10%.

(a) How much of the radioactive substance is left after 2 years?

(b) Let  $Q(t)$  be the amount of the substance (in grams) after  $t$  years. Find a formula for  $Q(t)$  in terms of  $t$ .

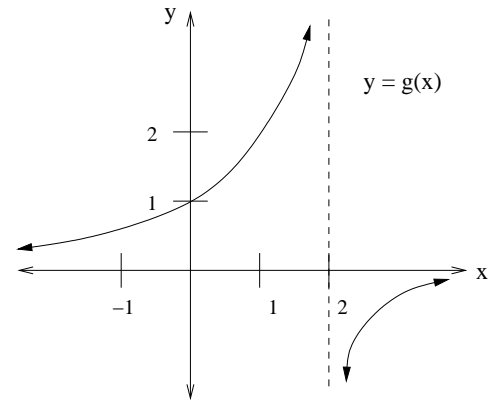
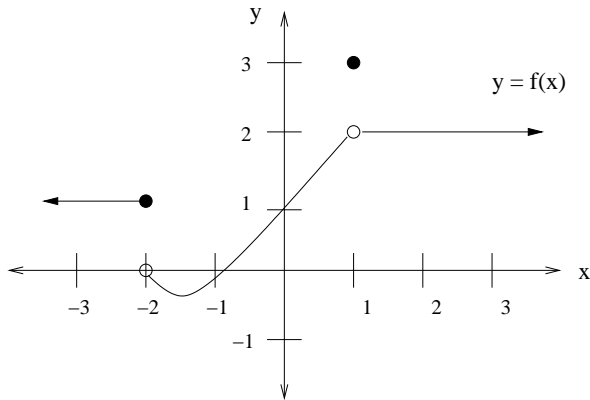
(c) What is the half-life of this substance? (i.e. How many years until only one half of the initial quantity remains?)

3. (6 points) Find a solution to the given equation. Please remember to show all of your work.

(a)  $12^{x-1} = 3e^{4+x}$

(b)  $2 = 4 \cos(2x - 1) + 6$

4. (6 points) Use the graphs of  $f$  and  $g$  to evaluate the given limit. If the limit does not exist, write “does not exist”. You do not need to justify your answers.



(a)  $\lim_{x \rightarrow 2} g(x)$

(b)  $\lim_{x \rightarrow 1} f(x)$

(c)  $\lim_{x \rightarrow -2^-} f(x)$

(d)  $\lim_{x \rightarrow 0} [f(x) + g(x)]$

(e)  $\lim_{x \rightarrow 2} \frac{f(x)}{g(x)}$

(f)  $\lim_{x \rightarrow \infty} g(x)$