Math 112–008 Midterm #2
Instructor: David Love Name: Blue Key March 6, 2009

- No partial credit will be given for multiple choice problems.
- For all others, show **all** algebraic work to receive full credit.
- Please turn OFF all cell phones, pagers, and other communication devices and put them out of sight.
- All textbooks, notes, etc. must be put away.

Student's Name (please print): _____
By signing my name below, I agree that I am following all rules and regulations set forth by the Code of Academic Integrity. Furthermore, I agree that I am following all rules set by my instructor and by the course policy for this exam. This includes ensuring that all calculator programs except possibly EVALUATE and QUADRATIC FORMULA have been deleted.

Student's Signature: _____ Date: _____

1. Write a formula for each of the transformations of $g(x) = \sqrt{x}$

2 - Shift
2 - Axis
2 - Direction

(i) Shift $g(x)$ 4 units to the left.

$g(x-(-4)) = \sqrt{x+4}$

$\sqrt{x}+4 \rightarrow 3$

4 - refl
2 - axis

(ii) Reflect $g(x)$ across the x-axis.

$-g(x) = -\sqrt{x}$

2 - shift
1 - direc.
2 - refl
1 - axis

(iii) Reflect $g(x)$ across the y-axis then shift down 3 units.

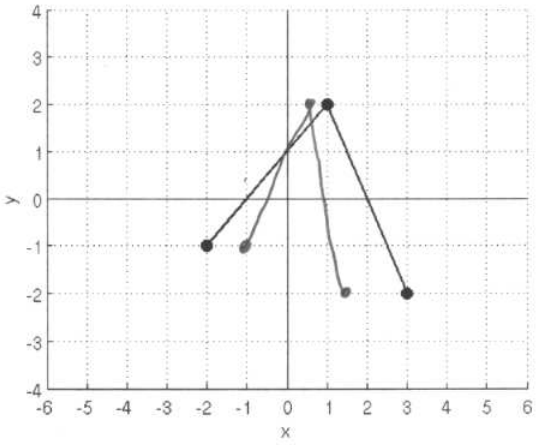
$g(-x) - 3 = \sqrt{-x} - 3$

2. The graph below represents $y = f(x)$. On the same axes, carefully draw $y = f(2x)$.

2 - stretch / compress

2 - axis

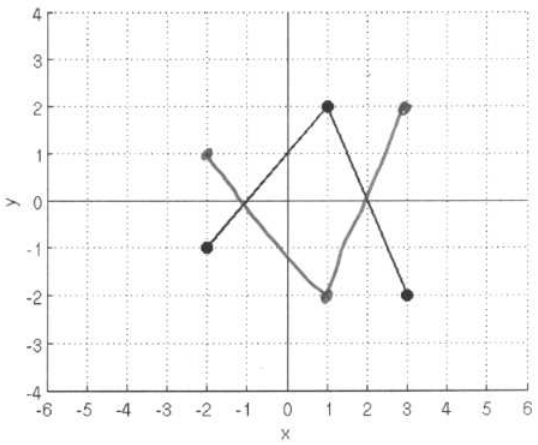
2 - direction



3. The graph below represents $y = f(x)$. On the same axes, carefully draw $y = -f(x)$.

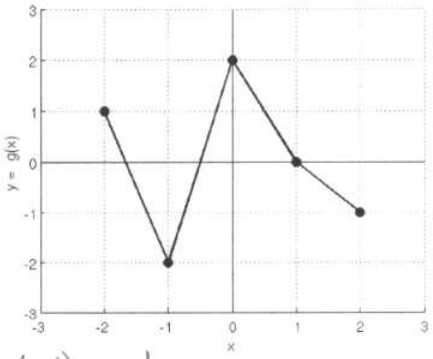
3 - reflection

3 - axis



4. The functions $f(x)$ and $g(x)$ are represented below. Use them to find the following (choose the best answer for each)

x	-2	-1	0	1	2
$f(x)$	-1	1	2	2	0



2 (i) $(f-g)(2)$ $f(2)-g(2) = 0-(-1) = 1$

a) 4 b) 3 c) 5 d) 1 e) -2

2 (ii) $(fg)(1)$ $f(1)g(1) = (2)(0) = 0$

a) 1 b) 0 c) 2 d) -1 e) undefined

2 (iii) $(f \circ g)(-1)$ $f(g(-1)) = f(-2) = -1$

a) -2 b) -1 c) 0 d) 1 e) 2

5 5. Find functions $f(x)$ and $g(x)$ so that $(f \circ g)(x) = 4\sqrt{3x+1}$. Which of the following could be choices for $f(x)$ and $g(x)$?

(1) $f(x) = 4$ and $g(x) = \sqrt{3x+1}$
(2) $f(x) = 4\sqrt{x}$ and $g(x) = 3x+1$
(3) $f(x) = 4\sqrt{x+1}$ and $g(x) = 3x$

a) 1 only b) 3 only c) 1 and 2 only d) 2 and 3 only e) 1 and 3 only

6. Use the functions $f(x) = x^2 - 1$ and $g(x) = \dfrac{1}{3-x}$ to answer the following

4 (i) What is the domain of $(f+g)(x)$?

$x \neq 3$

2 - interval excluding 3.

4 (ii) What is the domain of $\left(\dfrac{g}{f}\right)(x)$?

2 pts for 1 of second 2 (ea) $x \neq 3, 1, -1$

1 pts. for weird intervals that involve one of the point.

5 (iii) Find $(g \circ f)(x)$ and simplify as much as possible.

$g(f(x)) = \dfrac{1}{3-(x^2-1)} = \dfrac{1}{4-x^2}$

2 - for $(f \circ g)$ correctly

4 - minor arithmetic mistake.

6 7. Find the equation of a line going through the points $\left(\dfrac{5}{3}, 1\right)$ and $(2, 2)$. Express your answer in slope-intercept form.

1 - backwards slope

3 - correct slope $\dfrac{2-1}{2-\frac{5}{3}} = \dfrac{1}{\frac{1}{3}} = 3$

3 - correct b. $y = 3(x-2)+2$

$y = 3x - 4$

5 8. Find an equation of a line perpendicular to $6x + 3y = 1$ passing through the point $(1, 1)$. Express your answer in either point-slope or slope-intercept form.

$3y = -6x + 1$ $\quad y = -2x + \frac{1}{3}$ $\quad \rightarrow \quad y = \frac{1}{2}(x-1) + 1$

$y = \frac{1}{2}x + \frac{1}{2}$

3 - correct slope calc.

2 - correct b.

-1 - minor arithmetic mistake.

4 9. Find an equation, in slope-intercept form, of a line parallel to $y = 2(x - 3) + 7$, and passing through the point $(0, 5)$. Choose the best answer

a) $y = -\frac{1}{2}x + 5$ b) $y = 2x - 5$ c) $y = 2x + 5$ d) $y = -\frac{1}{2}x - 5$

5 10. It costs a company \$45.00 to produce a pair of shoes. In turn, the company sells a pair for \$90.00. If the fixed costs are \$720.00, how many pairs should the company produce and sell in order to break even (incur no loss and make no profit)?

Profit = \$45 $\quad 45x = 720 \Rightarrow x = 16$

3 - odd setup, makes sense kinda.

3 - correct setup.

-1 - minor arithmetic mistake

11. A mortgage lender charges a two types of fees, a fixed fee of \$400 and an additional fee of 2% of the amount of the loan.

6 (i) Find a function that determines the total fee in terms of the amount of the loan.

$F = 400 + 0.02\ell$

2 ¾ - valid setup that involves the #s

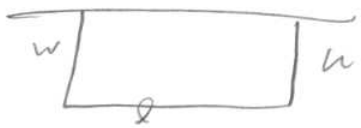
4 (ii) On a particular loan, the fee was \$1400. What was the amount of the loan? Choose the best answer.

a) \$10,000 b) \$20,000 c) \$30,000 d) \$40,000 e) \$50,000

$1400 = 0.02\ell$

$\rightarrow \ell = \$50{,}000$

4 12. A farmer plans to build a rectangular sheep pen alongside his barn. Since the pen will be up against the barn, that side of the pen will not need fencing. What is the largest area that can be enclosed with 100 feet of fence?



$100 = \ell + 2w \rightarrow \ell = 100 - 2w$

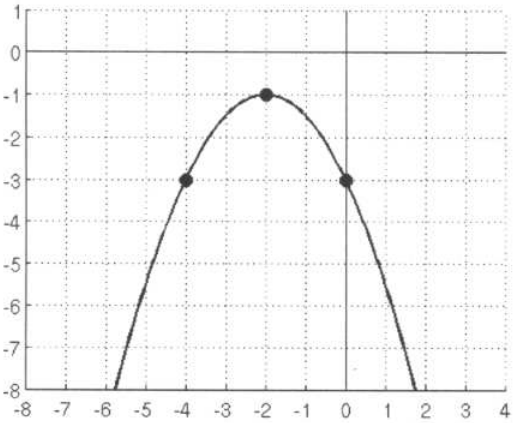
$A = \ell w = (100 - 2w)w = -2w^2 + 100w$

$= -2(w^2 - 50w + 625 - 625)$

$= -2(w - 25)^2 + 1250$

1 - $A = \ell w$
1 - $100 = \ell + 2w$
1 - subs
1 - vertex eqn.

5 13. Write an equation in **standard form** for the quadratic function graphed below.



$y = a(x+2)^2 - 1$

$-3 = a(0+2)^2 - 1$

$-3 = 4a - 1$

$-2 = 4a \rightarrow a = -\frac{1}{2}$

$y = -\frac{1}{2}(x+2)^2 - 1$

3 – vertex
2 – vertex w/ sign error
1 – Attempt to find a
1 – Find a correctly

8 14. Complete the square to write the function $g(x) = 2x^2 - 24x + 85$ in standard form. Write the equation in standard form and its vertex in the spaces below

2 – vertex
2 – c Standard Form Equation: $2(x-6)^2 + 13$

4 Vertex: $(6, 13)$

3 – sign error

$2(x^2 - 12x + (6)^2 - (6)^2) + 85$

$2(x-6)^2 + 13$

$h = \frac{-b}{2a} = \frac{24}{4} = 6$

$k = c - \frac{b^2}{4a} = 85 - \frac{24^2}{8} = 13$