MAC1105 Test 3
(D. Howard 3-16)

Name Key

1. Given the table for *f(x)*,

x	$f(x)$
3	-1
4	2
5	10

Construct a **table** using your shifting rules that describes each of the new translated functions. You need not show a graph.

6 a.) $f(x)+5$

X	Y
3	4
4	7
5	15

Add 5 to y's

6 b.) $f(-2x)$

X	Y
-3/2	-1
-2	2
-5/2	10

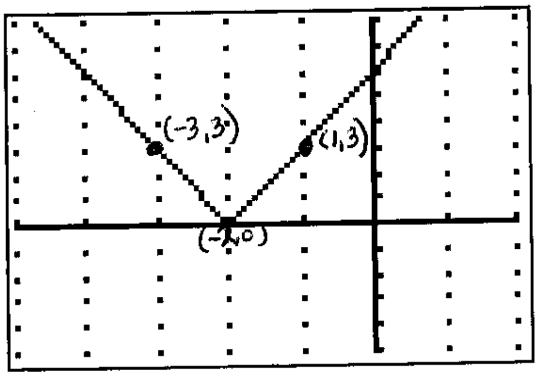
mult $-\frac{1}{2}$ to x's

6 c.) $f(x+4)$

X	Y
-1	-1
0	2
1	10

Subtract 4 to x's

2. Given the graph of *f(x)*. Assume each tick mark is one unit.



a.) Determine if the function is one-to-one. Explain why.

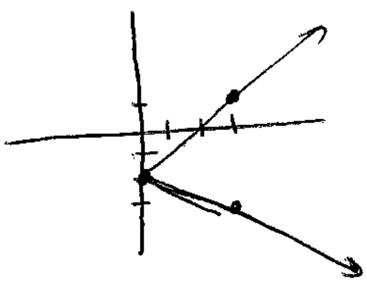
6 No, it fails the HLT.

b.) How has the function been shifted from its standard graph?

6 Left 2

c.) Sketch a graph of the inverse.

6



3. Given $f(x)=\frac{1}{x}$ and $g(x)=\sqrt[3]{x+2}$. Find the following.

6 a.) $(f+g)(x)=$ $\frac{1}{x}+\sqrt[3]{x+2}$

6 b.) $(f/g)(x)=$ $\dfrac{\frac{1}{x}}{\frac{\sqrt[3]{x+2}}{1}} = \dfrac{1}{x\sqrt[3]{x+2}}$

6 c.) $(f\circ g)(x)=$ $\dfrac{1}{\sqrt[3]{x+2}}$

6 d.) $(g\circ f)(x)=$ $\sqrt[3]{\frac{1}{x}+2}$

6 e.) Find $g^{-1}(x)$.

$$x^3=\left(\sqrt[3]{y+2}\right)^3$$
$$x^3=y+2$$
$$\boxed{x^3-2=y=g^{-1}(x)}$$

4. Given the tables for *f(x)* and *g(x)*. Find the following.

x	$f(x)$
-1	3
2	-2
8	0

x	$g(x)$
-2	3
2	8
5	-2

x	$g^{-1}(x)$
3	-2
8	2
-2	5

6 a.) $(g\circ f)(2)=$ $g(f(2))=g(-2)=3$

6 b.) $g^{-1}(-2)=$ 5

5. Solve $2x^2 - 5x - 3 > 0$.

a.) Algebraically.

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$(2x+1)(x-3)=0$

$2x+1=0 \quad x-3=0$

$x=-\frac{1}{2} \quad x=3$

or

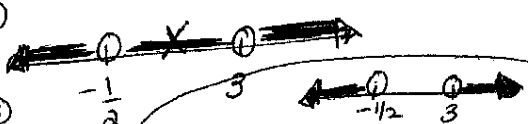
$a=2 \quad b=-5 \quad c=-3$

$x = \frac{-(-5) \pm \sqrt{(-5)^2-4(2)(-3)}}{2(2)}$

$x = \frac{5 \pm \sqrt{25+24}}{4} = \frac{5 \pm \sqrt{49}}{4}$

$x = \frac{5 \pm 7}{4} = -\frac{1}{2}, 3$

x	Y
0	$-3 > 0$ ☹
-1	$4 > 0$ ☺
4	$9 > 0$ ☺



$x < -\frac{1}{2} \cup x > 3$

$(-\infty, -\frac{1}{2}) \cup (3, \infty)$

b.) Graphically.

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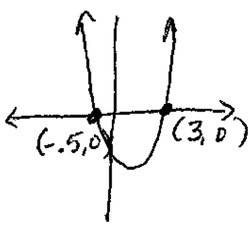

$x < -\frac{1}{2} \cup x > 3$

$(-\infty, -\frac{1}{2}) \cup (3, \infty)$

6. The total revenue for a certain product is given by $R(x) = 640x$ dollars and the total cost is $C(x) = 30{,}000 + 40x + x^2$ dollars where x is the number of units produced or sold. When is the profit at least \$30,000? Solve by a method of your choice, but remember to show work.

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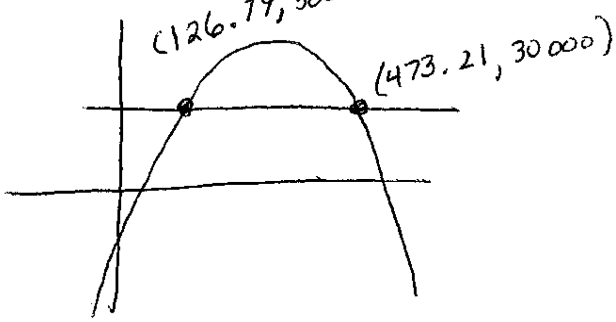
$P = R - C = 640x - (30{,}000 + 40x + x^2)$

$P = -30{,}000 + 600x - x^2$

$-30{,}000 + 600x - x^2 \geq 30{,}000$



$126.79 < x < 473.21$

$0 \geq x^2 - 600x + 60{,}000$

$a=1 \quad b=-600 \quad c=60{,}000$

$x = \frac{-(-600) \pm \sqrt{(-600)^2 - 4(1)(60{,}000)}}{2(1)}$

$x = \frac{600 \pm \sqrt{360000 - 240000}}{2}$

$x = \frac{600 \pm \sqrt{120000}}{2}$

$x = 473.21, 126.79$