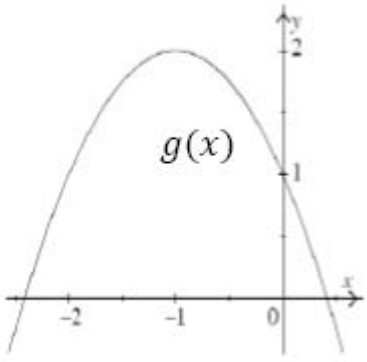
King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math (001)-Term (181)
Recitation (2. 6)

Question 1: If the graph of the function $y = g(x)$ below is obtained the graph of $f(x) = x^2$, then which one of the following is TRUE about the graph of g.



(a) $g(x) = -f(x+1) + 2$
(b) $g(x) = -f(x+1) + 1$
(c) $g(x) = f(x-1) + 2$
(d) $g(x) = -f(x-1) + 2$
(e) $g(x) = f(x+1) + 1$

Answer: (a): $-f(x+1) + 2$

Question 2:

(a): Describe how the graph of $y = -2\sqrt{x+2} - 3$ can be obtained from the graph of $y = \sqrt{x-2} + 2$

(b): If the graph $g(x) = |x|$ by translated three units down, five units left, and reflected across the x-axis, then write the new equation.

(c): If the graph of $g(x) = x^2 - 2x + 1$ is reflected across the y-axis, translated two units right, one unit down, and reflected across the x-axis, then write the new equation.

Solution:

(a): $y = \sqrt{x-2} + 2$

$$\xrightarrow{\text{Reflect accross the x - axis}} y = -(\sqrt{x-2} + 2) = -\sqrt{x-2} - 2$$

$$\xrightarrow{\text{Vertical stretching by a factor 2}} y = 2(-\sqrt{x-2} - 2) = -2\sqrt{x-2} - 4$$

$$\xrightarrow{\text{4 units left and 1 unit up}} y = -2\sqrt{x+4-2} - 4 + 1 = -2\sqrt{x+2} - 3$$

Another Method (a):

$$y = \sqrt{x-2} + 2 \xrightarrow{\text{4 units left}} y = \sqrt{x+4-2} + 2 = \sqrt{x+2} + 2$$

$$\xrightarrow{\text{Vertical stretching by a factor 2}} y = 2(\sqrt{x+2} + 2)$$

$\xrightarrow{\text{Reflect accross the x - axis}} y = -2(\sqrt{x+2}+2) = -2\sqrt{x+2}-4$

$\xrightarrow{\text{1 unit up}} y = -2\sqrt{x+2}-4+1 = -2\sqrt{x+2}-3$

(b): $g(x) = |x| \xrightarrow{\text{3 units down and 5 units left}} g(x) = |x+5|-3$

$\xrightarrow{\text{Reflect accross the x - axis}} y = -(|x+5|-3) \Rightarrow f(x) = -|x+5|+3$

Answer: $f(x) = -|x+5|+3$

(c): $g(x) = x^2 - 2x + 1 = (x-1)^2$

$\xrightarrow{\text{Reflect accross the y - axis}} y = (-x-1)^2$

$\xrightarrow{\text{shifting 2 units right and 1 unit dwon}} y = [-(x-2)-1]^2 - 1 = (-x+1)^2 - 1$

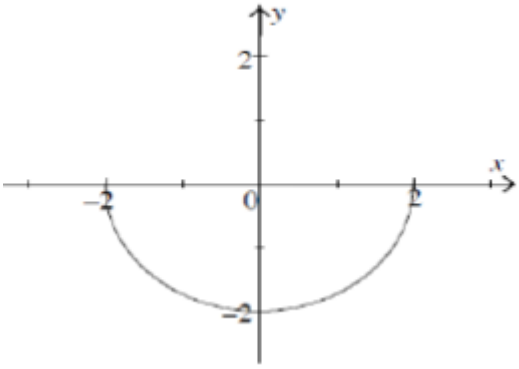
$\xrightarrow{\text{Reflect accross the x - axis}} y = -[(-x+1)^2 - 1] = -(-x+1)^2 + 1$

Answer: $g(x) = -(-x+1)^2 + 1$

Question 3: If $f(-4) = 2$, then find the coordinates of the point that lie on the graph of

$g(x) = -2f(-x-1) - 2$ **Answer:** $(3,-6)$

Question 4: If figure below is the graph of $y = f(x)$, then find the domain **D** and the range **R** of the function $g(x) = -\frac{1}{2} f\left(\frac{x}{2}\right)$



Answer: $D = [-4,4]$ and $Range = [0,1]$

Question 5: Which one of the following statements is **TRUE**

(a) $f(x) = x + \frac{1}{x}$ is an even function.

(b) $f(x) = 1 - \sqrt[3]{x}$ is neither even nor odd.

(c) $f(x) = 3x^3 + 2x^2 + 1$ is an odd function.

(d) $f(x) = 2x^2 - 3|x|^5 + 5$ is an even function.

(e) $f(x) = \frac{\sqrt{4x - x^2}}{x^7 + 1}$ is an odd function.

Answer: **(a)** False **(b)** **TRUE** **(c)** False **(d)** **TRUE** **(e)** False