Review

① Given $f(x) = \begin{cases} -3 & \text{if } x < -2 \\ 2x+4 & \text{if } -2 \leq x < 2 \\ -(x-3)^2+1 & \text{if } x \geq 2 \end{cases}$

(a) Evaluate:

$$f(-2) + 3f(2) + [f(0)]^2$$

(b) Sketch $f(x)$

(a) $f(-2) = 2(-2)+4$
$= 0$

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

$f(0) = 2(0)+4$
$= 4$

$= 0 + 3(0) + (4)^2$

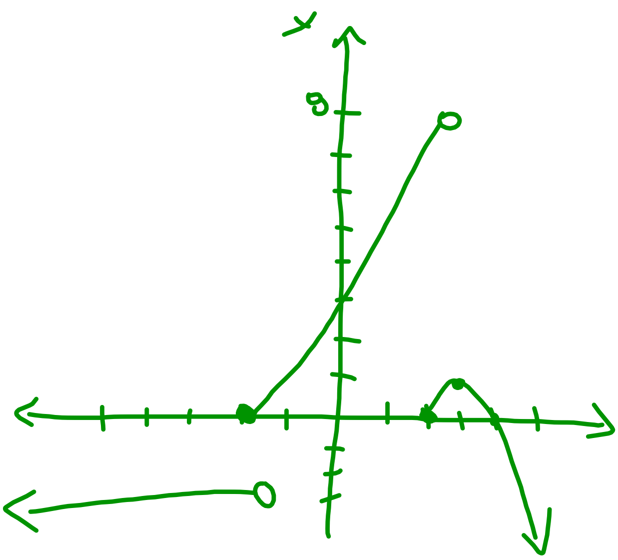
$= 16$

① $y=-3$ ② $y=2x+4$ ③ $y=-(x-3)^2+1$

x	y
-2	0
2	8

$V(3,1)$

x	y
2	0



ex. 2/ $f(x)=x+3$ $g(x)=2-x^2$ $h(x)=4x^2$

(a) Evaluate $(f+g)(-1)$

(b) Evaluate $fg(3w)$

(c) Evaluate $h[f(0)]$

(d) Evaluate $g\circ h\circ f(-1)$

(e) Express in simplest form: $g(-2y)+3f(y^2+1)+h(y-2)$

(a) $(f+g)(-1)$
$=f(-1)+g(-1)$
$f(-1)=-1+3$
$=2$
$g(-1)=2-(-1)^2$
$=1$
$=2+1$
$=3$

(b) $fg(3w)$
$[f(3w)]\times[g(3w)]$
$f(3w)=3w+3$
$g(3w)=2-(3w)^2$
$=2-9w^2$
$(3w+3)(2-9w^2)$
$6w-27w^3+6-27w^2$

$h(x)=4x^2$ $f(x)=x+3$

(c) $h[f(0)]$
$f(0)=0+3$
$=3$
$h(3)=4(3)^2$
$=\underline{\underline{36}}$

(d) $g\circ h\circ f(-1)$
$f(-1)=-1+3=2$
$h(2)=4(2)^2=16$
$g(16)=2-(16)^2$
$=\underline{-254}$

e) $g(-2y)=2-(-2y)^2$
$=2-4y^2$

$f(y^2+1)=(y^2+1)+3$
$=y^2+4$

$h(y-2)=4(y-2)^2$
$=4(y^2-4y+4)$
$=4y^2-16y+16$

$=(2-4y^2)+3(y^2+4)+(4y^2-16y+16)$
$=2-4y^2+3y^2+12+4y^2-16y+16$
$\boxed{=3y^2-16y+30}$

3/ Given $f(x)=\sqrt{x}$ is
- stretched vertically by a factor of 3
- Reflected in y-axis
- Stretched horizontally by a factor of $\frac{3}{8}$
- Shifted left 7
- Shifted up 3

What is new equation of $f(x)$??

$$f(x)=3\sqrt{-\frac{8}{3}(x+7)}+3$$

(b) If $(9,3)$ is on $f(x)$, where is this point after transformations applied??

$(x,y)\rightarrow\left(-\frac{3}{8}x-7,\ 3y+3\right)$

$(9,3)\rightarrow\left(-\frac{3}{8}\frac{(9)}{1}-7,\ 3(3)+3\right)$

$-\frac{27}{8}-\frac{56}{8}$

$\left(-\frac{83}{8},12\right)$

3/ Given $\frac{3(h(x)-2)}{3} = \frac{-12}{3} f(4x-20) \frac{+6}{3}$

h(x) is a transformation of f(x)..

- Reflection in x-axis? yes
- " " y-axis? No
- Ver. Stretch? ×4
- H. Stretch? $\frac{1}{4}$
- H. shift? Rt. 5
- V. Shift? Up 4

$h(x) \cancel{-2} = -4f[4(x-5)]$ $+2$

$h(x) = -4f[4(x-5)] + 4$ $+2$ $+2$

Inverses

ex. Given $f(x) = 2(x+3)^3 - 1$

(a) find $f^{-1}(x)$

(b) determine $f^{-1}(5)$

(a) $x = 2(y+3)^3 - 1$

$$\frac{x+1}{2} = \frac{2(y+3)^3}{2}$$

$$\sqrt[3]{\frac{x+1}{2}} = \sqrt[3]{(y+3)^3}$$

$$\sqrt[3]{\frac{x+1}{2}} = y+3$$

$$y = \sqrt[3]{\frac{x+1}{2}} - 3$$

$$f^{-1}(x) = \sqrt[3]{\frac{x+1}{2}} - 3$$

b) $f^{-1}(5) = \sqrt[3]{\frac{5+1}{2}} - 3$

$$= \sqrt[3]{3} - 3$$

$$(5, \sqrt[3]{3} - 3)$$