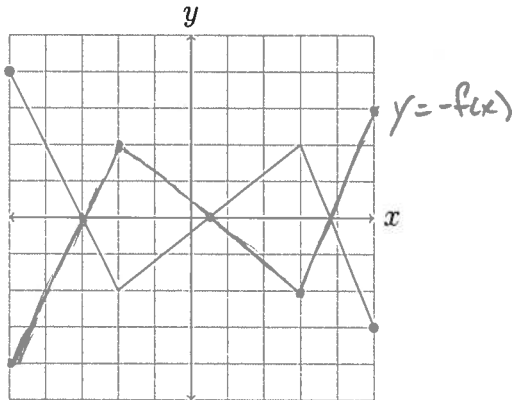
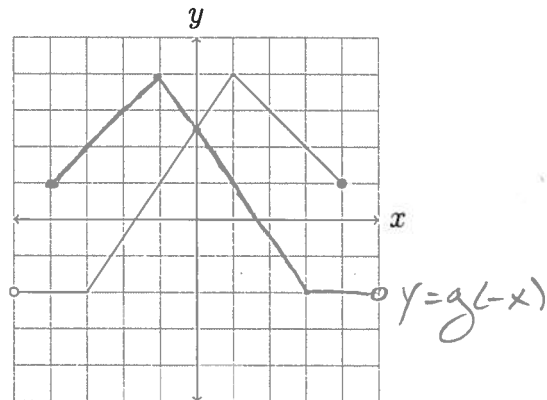


Name: Solutions

1. Given the following graph of $y = f(x)$, draw the graph of $y = -f(x)$.



2. Given the following graph of $y = g(x)$, draw the graph of $y = g(-x)$.



3. Use a transformation of $\text{sqr}(x) = x^2$ to graph $f(x) = (x - 4)^2 - 1$.

Key Points
on $\text{sqr}(x) = x^2$ right 4 down 1

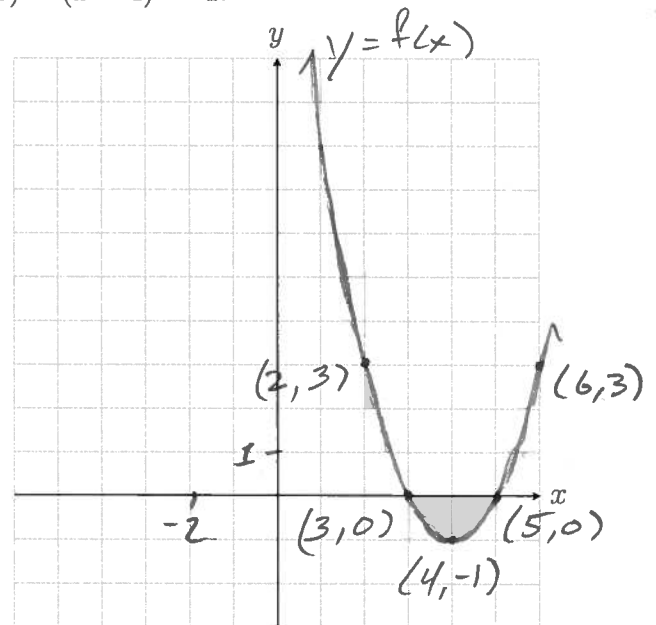
$$(-2, 4) \rightarrow (2, 4) \rightarrow (2, 3)$$

$$(-1, 1) \rightarrow (3, 1) \rightarrow (3, 0)$$

vertex $(0, 0) \rightarrow (4, 0) \rightarrow (4, -1)$

$$(1, 1) \rightarrow (5, 1) \rightarrow (5, 0)$$

$$(2, 4) \rightarrow (6, 4) \rightarrow (6, 3)$$



4. Use a transformation of $rat(x) = \frac{1}{x}$ to graph $h(x) = \frac{1}{x+2} + 3$.

Key $rat(x) = \frac{1}{x}$

stuff: left 2 up 3

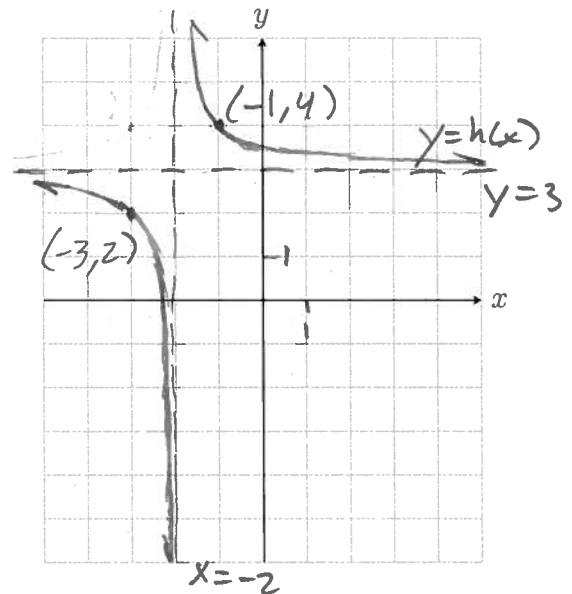
$(1, 1) \rightarrow (-1, 1) \rightarrow (-1, 4)$

$(-1, -1) \rightarrow (-3, -1) \rightarrow (-3, 2)$

$x=0 \rightarrow x=-2 \rightarrow x=-2$

$y=0 \rightarrow y=0 \rightarrow y=3$

asymptotes



5. Use a transformation of $sqr(x) = x^2$ to graph $j(x) = \frac{1}{2}x^2 + 3$.

Key $y = x^2$

divide
y by 2

up 3

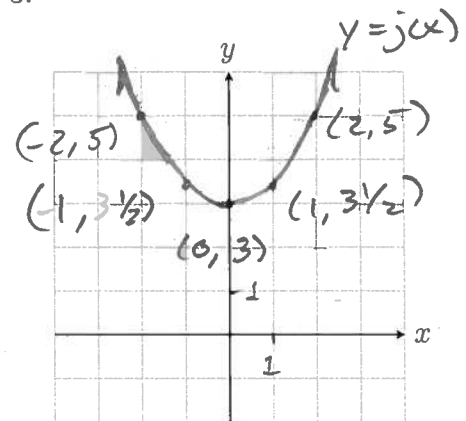
$(-2, 4) \rightarrow (-2, 2) \rightarrow (-2, 5)$

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

$(0, 0) \rightarrow (0, 0) \rightarrow (0, 3)$

$(1, 1) \rightarrow (1, \frac{1}{2}) \rightarrow (1, 3\frac{1}{2})$

$(2, 4) \rightarrow (2, 2) \rightarrow (2, 5)$



6. Use a transformation of $sqrt(x) = \sqrt{x}$ to graph $k(x) = 2\sqrt{x-3}$.

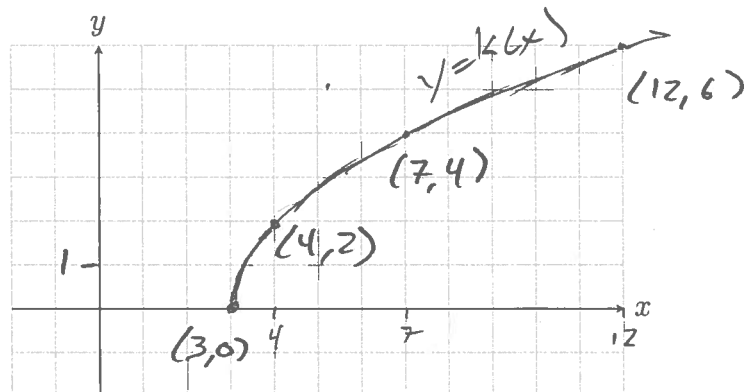
\sqrt{x} key pts mult. y by 2 right 3

$(0, 0) \rightarrow (0, 0) \rightarrow (3, 0)$

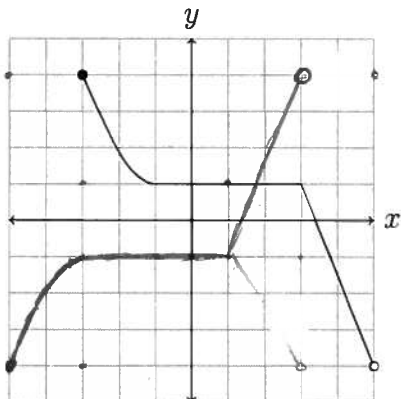
$(1, 1) \rightarrow (1, 2) \rightarrow (4, 2)$

$(4, 2) \rightarrow (4, 4) \rightarrow (7, 4)$

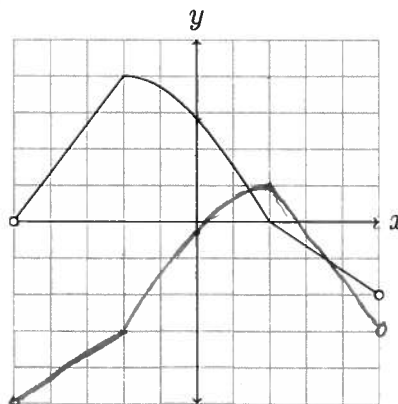
$(9, 3) \rightarrow (9, 6) \rightarrow (12, 6)$



7. Given the following graph of $y = r(x)$, draw the graph of $y = -r(x + 2)$.



8. Given the following graph of $y = s(x)$, draw the graph of $y = s(-x) - 3$.



9. Use a transformation of $\text{cubert}(x) = \sqrt[3]{x}$ to graph $q(x) = \sqrt[3]{2x - 4} - 2$.

$$q(x) = \sqrt[3]{2(x-2)} - 2$$

down 2 divide by 2 right 2

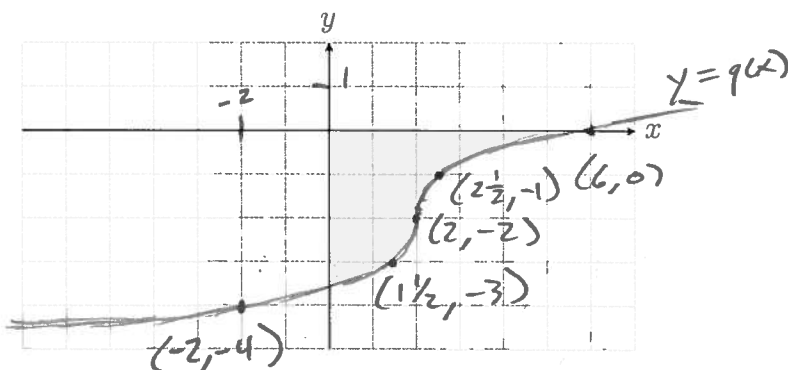
$$(-8, -2) \rightarrow (-8, -4) \rightarrow (-4, -4) \rightarrow (-2, -4)$$

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

$$(0, 0) \rightarrow (0, -2) \rightarrow (0, -2) \rightarrow (2, -2)$$

$$(1, 1) \rightarrow (1, -1) \rightarrow (\frac{1}{2}, -1) \rightarrow (2\frac{1}{2}, -1)$$

$$(8, 2) \rightarrow (8, 0) \rightarrow (4, 0) \rightarrow (6, 0)$$



10. Use a transformation of $\text{sqrt}(x) = \sqrt{x}$ to graph $l(x) = \sqrt{2-x} + 1$.

$$l(x) = \sqrt{-(x-2)} + 1$$

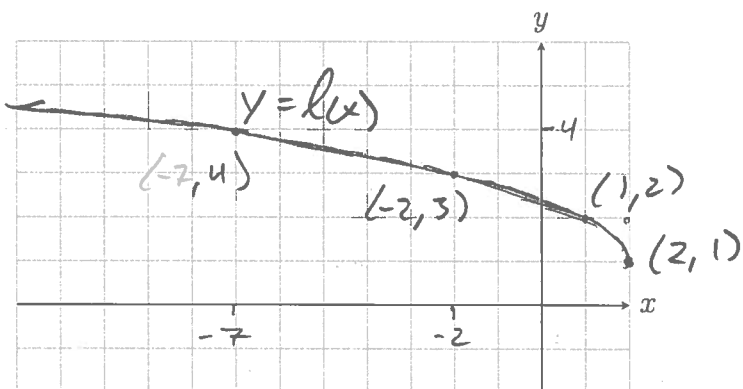
up 1 negate x right 2

$$(0, 0) \rightarrow (0, 1) \rightarrow (1, 1) \rightarrow (2, 1)$$

$$(1, 1) \rightarrow (1, 2) \rightarrow (-1, 2) \rightarrow (1, 2)$$

$$(4, 2) \rightarrow (4, 3) \rightarrow (-4, 3) \rightarrow (-2, 3)$$

$$(9, 3) \rightarrow (9, 4) \rightarrow (-9, 4) \rightarrow (-7, 4)$$



11. Use a transformation of $\text{cube}(x) = x^3$ to graph $p(x) = \left(\frac{1}{2}x + \frac{1}{2}\right)^3 - 1$.

$$p(x) = \left(\frac{1}{2}(x+1)\right)^3 - 1$$

down 1 divide x by 1/2 left 1

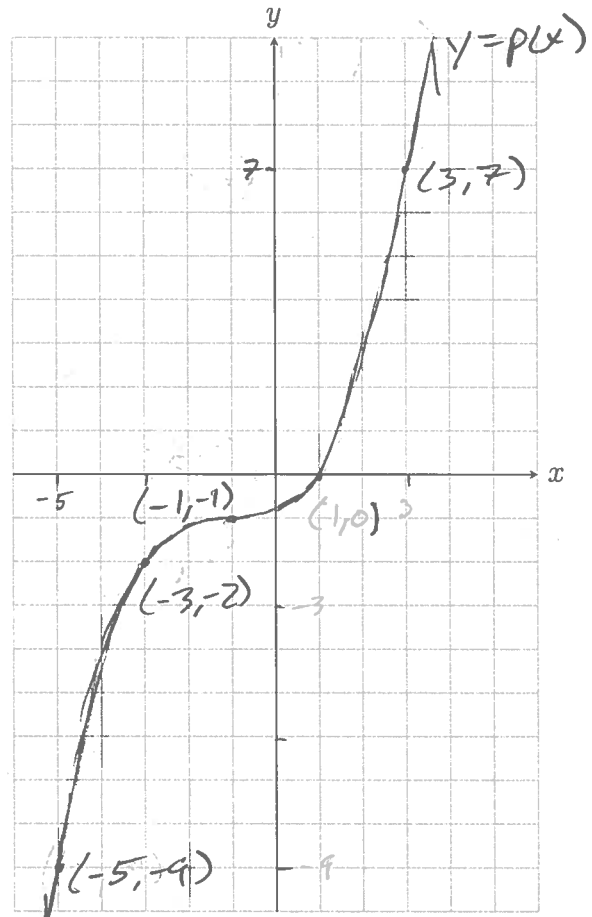
$$(-2, -8) \rightarrow (-2, -9) \rightarrow (-4, -9) \rightarrow (-5, -9)$$

$$(-1, -1) \rightarrow (-1, -2) \rightarrow (-2, -2) \rightarrow (-3, -2)$$

$$(0, 0) \rightarrow (0, -1) \rightarrow (0, -1) \rightarrow (-1, -1)$$

$$(1, 1) \rightarrow (1, 0) \rightarrow (2, 0) \rightarrow (1, 0)$$

$$(2, 8) \rightarrow (2, 7) \rightarrow (4, 7) \rightarrow (3, 7)$$



12. Use a transformation of $\text{sqr}(x) = x^2$ to graph the function $d(x) = -\frac{1}{3}(2(x-1))^2 + 2$.

key mult y by $-\frac{1}{3}$ up 2 divide x by 2 right 1

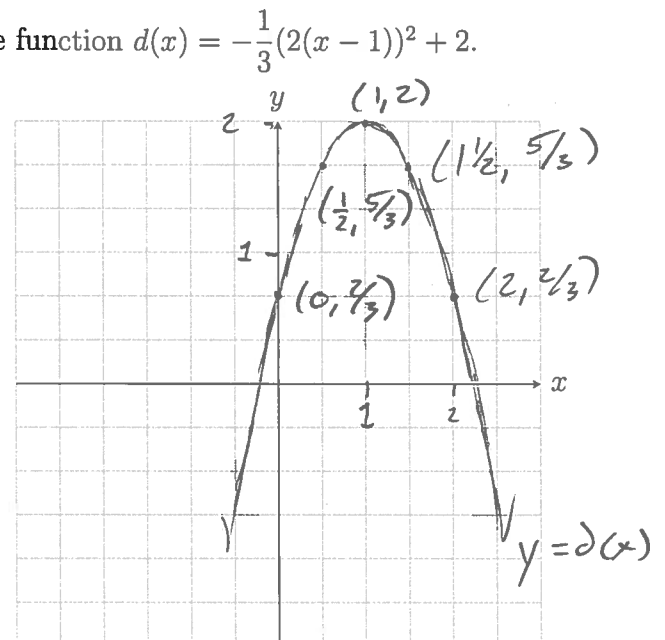
$$(-2, 4) \quad (-2, -\frac{4}{3}) \quad (-2, \frac{2}{3}) \quad (-1, \frac{2}{3}) \quad (0, \frac{2}{3})$$

$$(-1, 1) \quad (-1, -\frac{1}{3}) \quad (-1, \frac{5}{3}) \quad (-\frac{1}{2}, \frac{5}{3}) \quad (\frac{1}{2}, \frac{5}{3})$$

$$(0, 0) \quad (0, 0) \quad (0, 2) \quad (0, 2) \quad (1, 2)$$

$$(1, 1) \quad (1, -\frac{1}{3}) \quad (1, \frac{5}{3}) \quad (\frac{3}{2}, \frac{5}{3}) \quad (\frac{5}{2}, \frac{5}{3})$$

$$(2, 4) \quad (2, -\frac{4}{3}) \quad (2, \frac{2}{3}) \quad (1, \frac{2}{3}) \quad (2, \frac{2}{3})$$

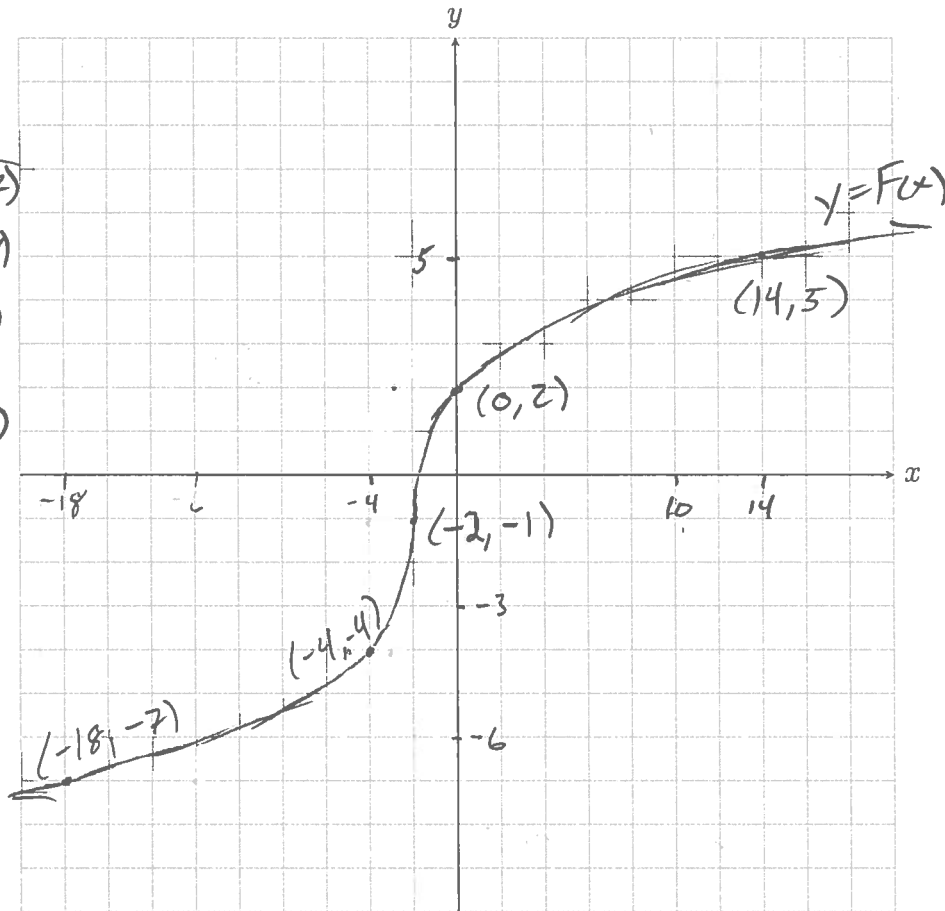


13. Use a transformation of $\text{cubert}(x) = \sqrt[3]{x}$ to graph the function $F(x) = 3\sqrt[3]{\frac{1}{2}x + 1} - 1$.

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

mult y
by 3 down 1 divide
x by
1/2 left
2

$(-18, -7)$ $(-8, -6)$ $(-8, -7)$ $(-16, -7)$ $(-18, -7)$
 $(-4, -4)$ $(-1, -3)$ $(-1, -4)$ $(-2, -4)$ $(-4, -4)$
 $(0, 0)$ $(0, -1)$ $(0, -1)$ $(-2, -1)$
 $(1, 1)$ $(1, 3)$ $(1, 2)$ $(2, 2)$ $(0, 2)$
 $(8, 2)$ $(8, 6)$ $(8, 5)$ $(16, 5)$ $(14, 5)$



14. Suppose the function $m(x) = x^2 + 5$ is shifted down two units and right one unit to obtain the graph of a new function n . Find the expression for n .

$$\begin{aligned}
 n(x) &= m(x-1) - 2 \\
 &= (x-1)^2 + 3
 \end{aligned}$$

15. Suppose the function $v(x) = \frac{1}{x-2} + 3$ is compressed horizontally by a factor of 2 and shifted down 4 to obtain the graph of a new function w . Find the expression for w .

$$\begin{aligned}
 w(x) &= v(2x) - 4 \\
 &= \frac{1}{2x-2} - 1
 \end{aligned}$$

