

Review Chapter 1

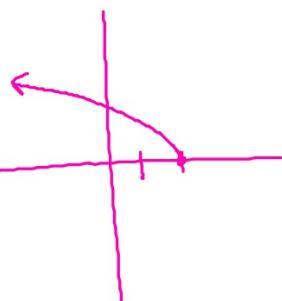
Find the domain of the following function

$$f(x) = \sqrt{2-x}$$

$$\begin{aligned} D: 2-x &\geq 0 \\ +x &+x \\ \hline 2 &\geq x \end{aligned}$$

$$(-\infty, 2]$$

$$R: [0, \infty)$$



- Match the equation with the graph with the table

(A) $y = 2x + 3$

(C) $y = 12 - 3x$

(E) $y = \sqrt{8 - x}$

(B) $y = x^2 + 5$

(D) $y = 4x + 3$

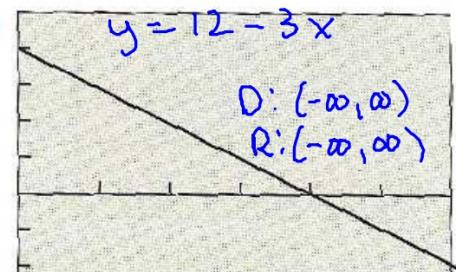
x	1	2	3	4	5	6
y	6	9	14	21	30	41

$y = x^2 + 5$

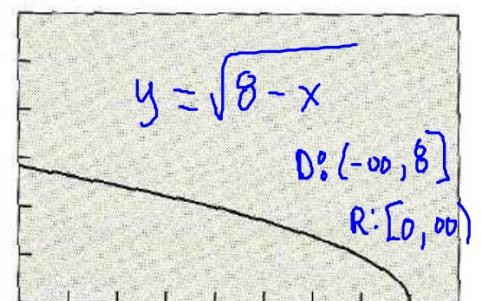
x	0	2	4	6	8	10
y	3	7	11	15	19	23

$\text{slope} = \frac{4}{2} = 2$

(A) $y = 2x + 3$



[0, 6] by [-9, 15]



[0, 9] by [0, 6]

Find the domain of the function algebraically

$$f(x) = \frac{x}{x^2 - 5x}$$

$$D: x(x-5) \neq 0$$

$$\begin{array}{c} \overline{x=0 \quad x=5} \\ (-\infty, 0) \cup (0, 5) \cup (5, \infty) \end{array}$$

$$f(x) = \frac{x}{x(x-5)}$$

$x=0$ Hole

$x=5$ VA

Find the domain of the function algebraically

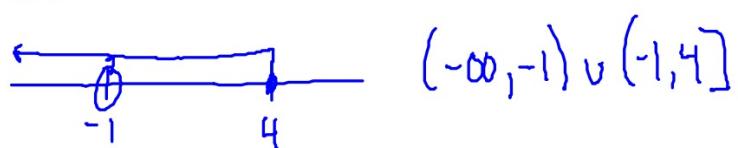
$$f(x) = \frac{\sqrt{4-x}}{(x+1)(x^2+1)}$$

D: $x+1 \neq 0$

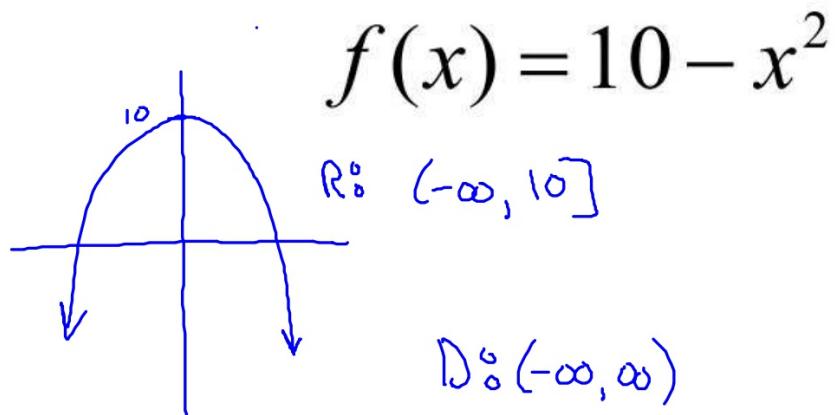
$$\boxed{x \neq -1}$$

$$\begin{array}{r} x^2+1 \neq 0 \\ -1 -1 \\ \hline \sqrt{x^2} \neq \sqrt{-1} \\ \text{Not Possible} \end{array}$$

$$\begin{array}{r} 4-x \geq 0 \\ +x +x \\ \hline 4 \geq x \end{array}$$



Find the range of the function algebraically



Find the range of the function algebraically

$$f(x) = 5 + \sqrt{4 - x}$$

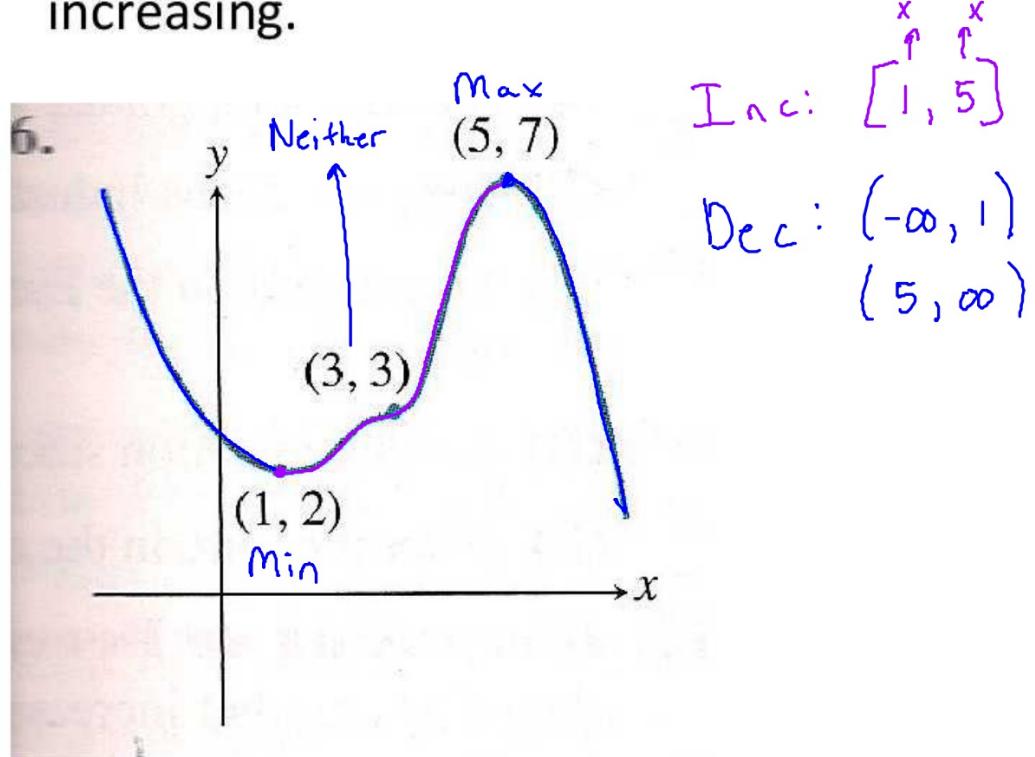
$\text{R: } [5, \infty)$ $\text{D: } 4 - x \geq 0$
 $4 \geq x$

Graph the function and tell whether or not it has a point of discontinuity at $x = 0$. If there is a discontinuity, tell whether it is **removeable** or non-removeable.

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

$x=0$ Hole

State whether each labeled point identifies a local maximum, a local minimum, or neither. Identify intervals on which the function is decreasing and increasing.



Determine whether the function is even, odd, or even. ~~neither~~

A) $f(x) = 5x^4 + 1$

$$\begin{aligned}f(1) &= 5+1=6 \\f(-1) &= 5+1=6\end{aligned}\quad \text{Even}$$

B) $f(x) = -x^2 + x + 2$

$$\begin{aligned}f(1) &= -1+1+2=2 \\f(-1) &= -(-1)^2 + (-1) + 2 = -1+(-1)+2=0\end{aligned}\quad \text{Neither}$$

C) $f(x) = 2x^3 + x$

Determine all horizontal and vertical asymptotes

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

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

HA: $y = \frac{x^2}{x^2} = 1$

VA: $x^2 - 1 = 0$

$$\begin{aligned} x^2 &= 1 \\ x &= \pm 1 \end{aligned}$$

Determine all horizontal and vertical asymptotes

$$f(x) = \frac{2x-4}{x^2-4}$$

HA: $y=0$

~~VA~~: $x^2-4=0$

$$x^2=4$$

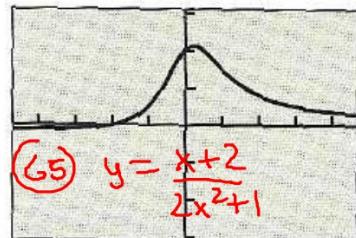
$$x=\pm 2$$

$$f(x) = \frac{2(x-2)}{(x+2)(x-2)}$$

$x=2$ Hole
 $x=-2$ VA

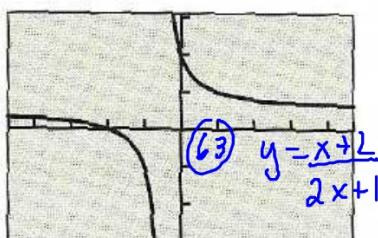
63. $y = \frac{x+2}{2x+1}$ HA: $y = \frac{1}{2}$
 VA: $2x+1=0$
 $x = -\frac{1}{2}$

65. $y = \frac{x+2}{2x^2+1}$ HA: $y = 0$
 VA: None



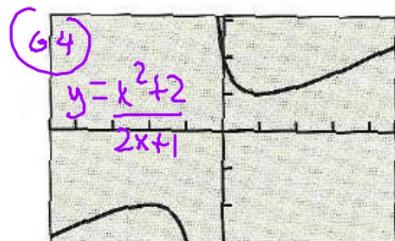
[−4.7, 4.7] by [−3.1, 3.1]

(a)



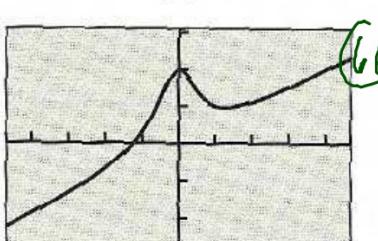
[−4.7, 4.7] by [−3.1, 3.1]

(b)



[−4.7, 4.7] by [−3.1, 3.1]

(c)



[−4.7, 4.7] by [−3.1, 3.1]

(d)

64. $y = \frac{x^2+2}{2x+1}$ HA: None
 VA: $x = -\frac{1}{2}$

66. $y = \frac{x^3+2}{2x^2+1}$

HA: None
 VA: None

Identify which of the twelve basic functions are increasing on their entire domain.

$$y = x$$

$$y = x^3$$

$$y = \sqrt{x}$$

$$y = e^x$$

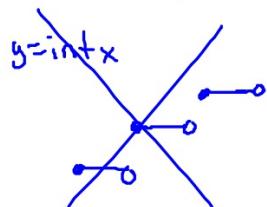
$$y = \ln x$$

$$y = \frac{1}{1 + e^{-x}}$$

Identify which of the twelve basic functions have infinitely many extrema.

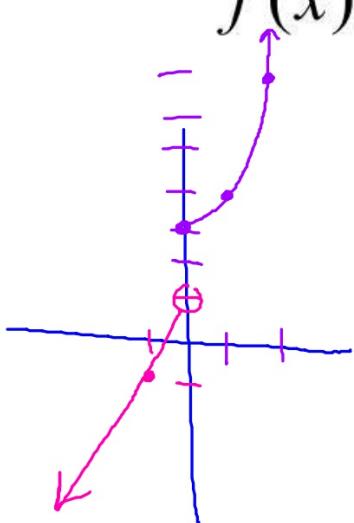
$$y = \sin x$$

$$y = \cos x$$



Graph the piecewise function

$$f(x) = \begin{cases} 2x+1 & x < 0 \\ x^2 + 3 & x \geq 0 \end{cases}$$



x	y = 2x+1
0	1
-1	-1
-2	-3

x	y = x ² + 3
0	3
1	4
2	7

Find formulas for f/g and g/f . Give the domain of each.

$$f(x) = \sqrt{x-2} \quad \text{and} \quad g(x) = x^2$$

$$\frac{f}{g} = \frac{\sqrt{x-2}}{x^2}$$

$$\frac{g}{f} = \frac{x^2}{\sqrt{x-2}}$$

$$\begin{aligned} x-2 &\geq 0 & x^2 &= 0 \\ x &\geq 2 & x &\neq 0 \end{aligned}$$


$$\begin{aligned} x-2 &> 0 \\ x &> 2 \end{aligned}$$

Find formulas for $f(g(x))$ and $g(f(x))$. Give the domain of each.

$$f(x) = x^2 - 2 \quad \text{and} \quad g(x) = \sqrt{x+1}$$

$$f(g(x)) = (\sqrt{x+1})^2 - 2 = x+1-2 = x-1 \quad D: \begin{array}{l} x+1 \geq 0 \\ x \geq -1 \end{array}$$

$$g(f(x)) = \sqrt{(x^2-2) + 1} = \sqrt{x^2-1} \quad D: \begin{array}{l} x^2-1 \geq 0 \\ x^2 \geq 1 \\ x \geq 1 \quad x \leq -1 \end{array}$$

Find a formulas for $f^{-1}(x)$. Give the domain

$$\text{Domain: } x+2 \geq 0$$

$$f(x) = \sqrt{x+2}$$

$$y = \sqrt{x+2}$$

$$D: [-2, \infty) \quad R: [0, \infty)$$

$$x = \sqrt{y+2}$$

$$x^2 = y+2$$

$$x^2 - 2 = y$$

$$D: [0, \infty) \quad R: [-2, \infty)$$

$$f^{-1}(x) = x^2 - 2$$

Find a formulas for $f^{-1}(x)$. Give the domain

$$f(x) = \sqrt{x+2}$$

Confirm that $f(x)$ and $g(x)$ are inverses.

$$f(g(x)) = x$$

$$g(f(x)) = x$$

$$f(x) = x^3 + 1$$

$$g(x) = \sqrt[3]{x - 1}$$

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

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

Sketch graphs of the following.

$$f(x) = |x|$$

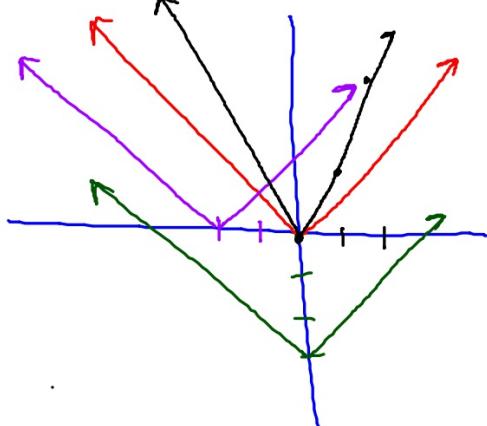
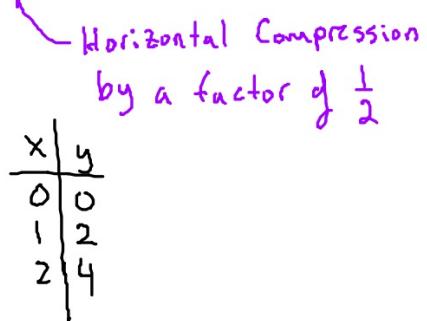
$$h(x) = |x| - 3$$

Down 3

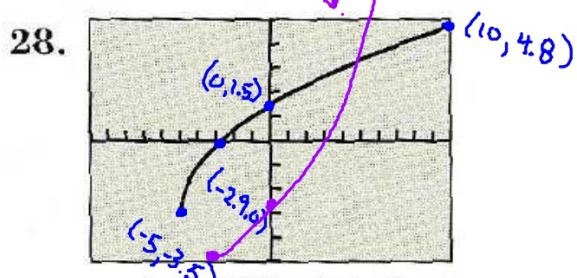
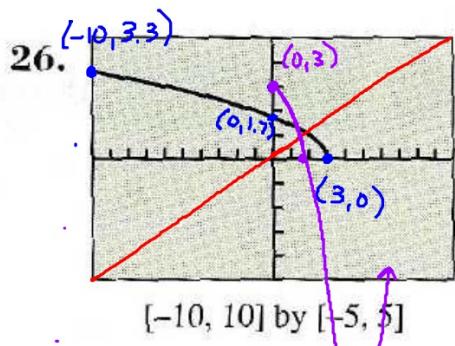
$$g(x) = |x + 2|$$

$$j(x) = |2x|$$

Left + 2



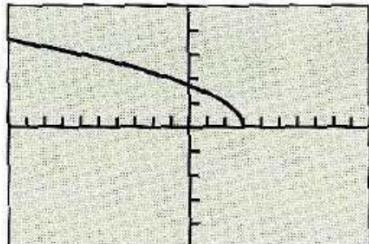
Draw the functions inverse



Vertical stretch = 2

Write a formula for each function

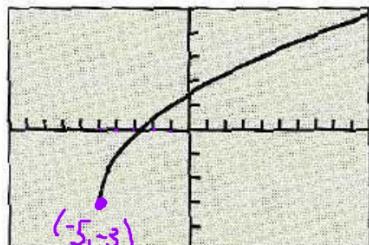
26.



$$y = \sqrt{-x + 3}$$

[-10, 10] by [-5, 5]

28.



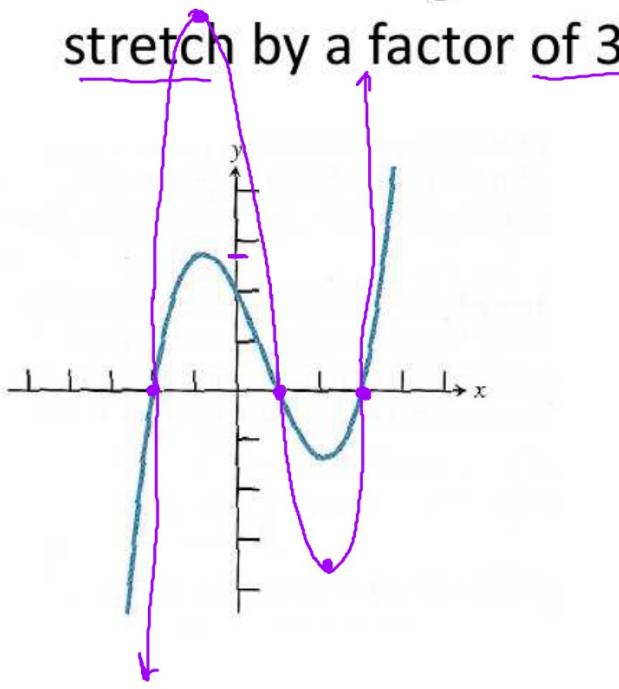
$$y = 2\sqrt{x + 5} - 3$$

[-10, 10] by [-5, 5]

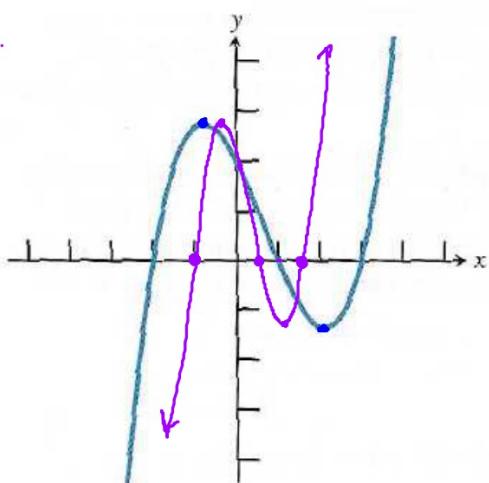
Vertical stretch = 2

- Transform the given function by a vertical stretch by a factor of 3

Multiply y's by 3



Transform the given function by a horizontal
stretch by a factor of $1/2$



compress: multiply the
x's by $\frac{1}{2}$

Write an equation whose graph is g.

$$f(x) = |x| \quad \text{a shift right 4 units, then a vertical stretch by a factor of 2, and shift down 4}$$

$$g(x) = 2|x - 4| - 4$$

Write an equation whose graph is g.

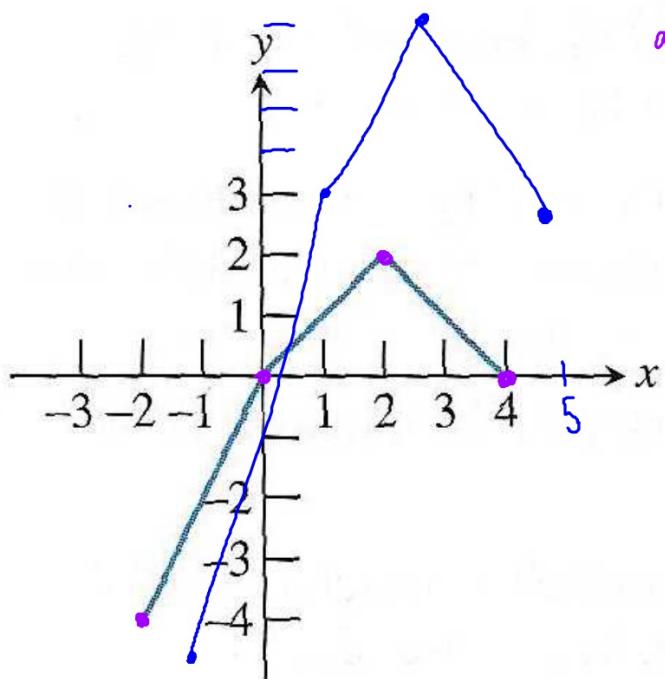
$$f(x) = x^2$$

a shift left 2 units, then a horizontal stretch by a factor of 2, and shift up 3

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

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

Sketch the graph of $g(x) = 3 + 2f(x-1)$



↑
vp 3
↑
mult y by 2
right 1
affect y

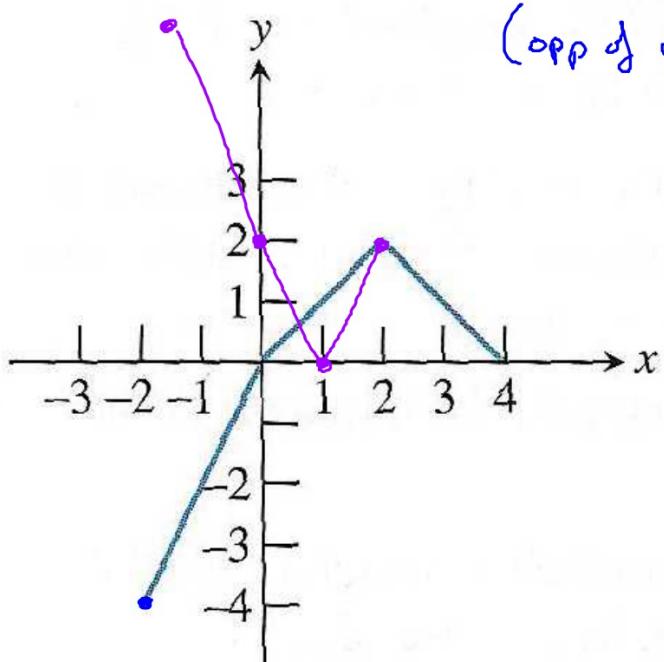
$$\begin{array}{l} g(x) \rightarrow (4, 0) \rightarrow (5, 3) \\ (2, 2) \rightarrow (2, 4) \rightarrow (3, 7) \\ (0, 0) \rightarrow (0, 0) \rightarrow (1, 3) \\ (-2, -4) \rightarrow (-2, -8) \rightarrow (-1, -5) \end{array}$$

Sketch the graph of $g(x) = -f(2x) + 2$

reflection over
the x-axis
(opp of y)

is up?

cut x in half



x	y
-2	-4
0	0
2	2
4	0

x	y
-1	6
0	2
1	0
2	2

