Functions and Transformations: REVIEW Name KEY

Describe how to transform the graph of f into the graph of g.

1) $f(x) = x^2$ to $g(x) = -(x - 9)^2$

* REFLECTION OVER X-AXIS (VERTICAL REFLECTION)
* HORIZONTAL SHIFT → 9

2) $f(x) = \sqrt{x}$ to $g(x) = \sqrt{-0.4x}+5$

* REFLECTION OVER Y-AXIS (HORIZONTAL REFLECTION)
* HORIZONTAL STRETCH BY A FACTOR OF 5/2 (OR 2.5)
* VERTICAL SHIFT ↑ 5

3) $f(x) = x^3$ to $g(x) = 2(-x + 3)^3 - 7$

* VERTICAL STRETCH BY A FACTOR OF 2
* REFLECTION OVER Y-AXIS (HORIZONTAL REFLECTION)
* HORIZONTAL SHIFT ← 3 * VERTICAL SHIFT ↓ 7

4) $f(x) = |x|$ to $g(x) = -|0.5x - 2|$

* REFLECTION OVER X-AXIS (VERTICAL REFLECTION)
* HORIZONTAL STRETCH BY A FACTOR OF 2
* HORIZONTAL SHIFT → 2

Determine algebraically whether the function is even, odd, or neither even nor odd.

5) $f(x) = 7x^4 + 7x + 5$

$f(-x) = 7(-x)^4 + 7(-x) + 5$ $\boxed{\text{NEITHER}}$

$= 7x^4 - 7x + 5$ ← NO CHANGE

NO CHANGE CHANGE

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

$f(-x) = 4(-x)^2 + 3 = 4x^2 + 3$ NO SIGN CHANGES $\Rightarrow$ $\boxed{\text{EVEN}}$

7) $f(x) = \sqrt{x^2 + 1}$

$f(-x) = \sqrt{(-x)^2 + 1} = \sqrt{x^2 + 1} \Rightarrow \boxed{\text{EVEN}}$

8) $f(x) = 3\sqrt[3]{x}$

$f(-x) = 3\sqrt[3]{-x} = 3(-\sqrt[3]{x}) = -3\sqrt[3]{x} \Rightarrow \boxed{\text{ODD}}$

Find the vertical asymptote(s) of the given function.

9) $f(x) = \dfrac{x - 9}{x^2 + 8x}$

$x^2 + 8x = 0$

$x(x+8) = 0$

$x = 0$ $\quad$ $x + 8 = 0$

$x = -8$

$$\boxed{\begin{array}{l} \text{V.A: } x = 0 \\ \qquad\;\; x = -8 \end{array}}$$

(DOMAIN WOULD BE: $(-\infty, -8) \cup (-8, 0) \cup (0, \infty)$)

10) $g(x) = \dfrac{x - 5}{(x - 9)(x + 5)}$

$(x-9)(x+5) = 0$

$x - 9 = 0$ $\quad$ $x + 5 = 0$

$x = 9$ $\quad$ $x = -5$

$$\boxed{\begin{array}{l} \text{V.A: } x = 9 \\ \qquad\;\; x = -5 \end{array}}$$

(DOMAIN: $(-\infty, -5) \cup (-5, 9) \cup (9, \infty)$)

11) $f(x) = \dfrac{x - 5}{x^2 - 9}$

$x^2 - 9 = 0$

$x^2 = 9$

$x = \pm 3$

OR

$x^2 - 9 = 0$

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

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

$x = -3$ $\quad$ $x = 3$

$$\boxed{\text{V.A: } x = \pm 3}$$

(DOMAIN: $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$)

Give the equation of the function g whose graph is described.

12) The graph of $f(x) = \sqrt[3]{x}$ is shifted 8.5 units to the left. This graph is then vertically stretched by a factor of 3.8. Finally, the graph is reflected across the x–axis.

$g(x) = -3.8\sqrt[3]{x + 8.5}$

13) The graph of $f(x) = |x|$ is reflected across the y–axis. This graph is then vertically stretched by a factor of 5.3. Finally, the graph is shifted 1 unit downward.

$g(x) = 5.3|-x| - 1$

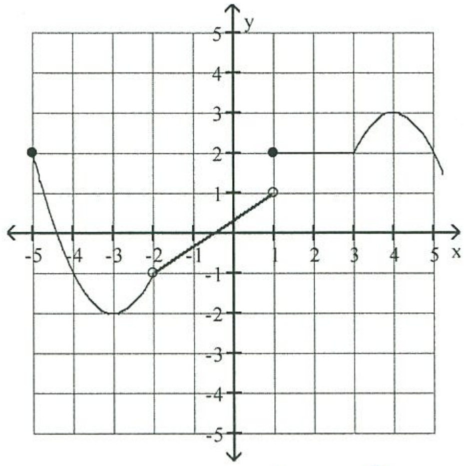
14) The graph of $f(x) = x^5$ is reflected across the x–axis, then horizontally stretched by a factor of 3, then shifted 2 units right, then shifted 7 units upward, then vertically stretched by a factor of 5.

$g(x) = -5\left(\frac{1}{3}x - 2\right)^5 + 7$

OR

$g(x) = -5\left(\frac{x}{3} - 2\right)^5 + 7$

15) Identify the following for the function shown:



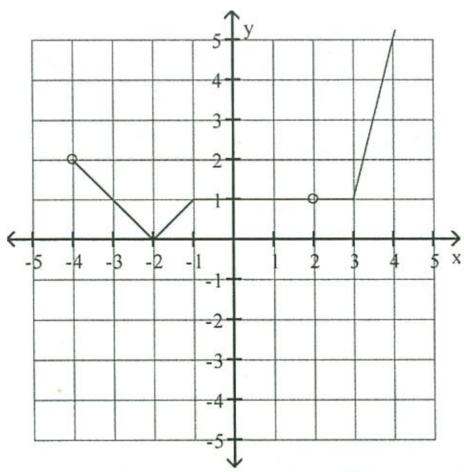
LOCAL $y=2$

Domain $[-5,-2)\cup(-2,\infty)$ Range $(-\infty,3]$ Maxima $y=3$ ABSOLUTE Minima LOCAL $y=-2$ NO ABSOLUTE

Intervals of x where the function is:

increasing $(-3,-2)$, $(-2,1)$, $(3,4)$ decreasing $[-5,-3)$, $(4,\infty)$ constant $[1,3)$

16) Identify the following for the function shown:



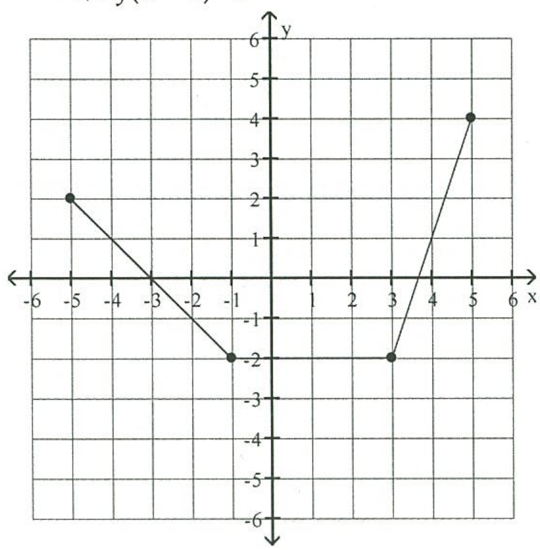
Domain $(-4,2)\cup(2,\infty)$ Range $[0,\infty)$ Maxima NO MAX Minima $y=0$

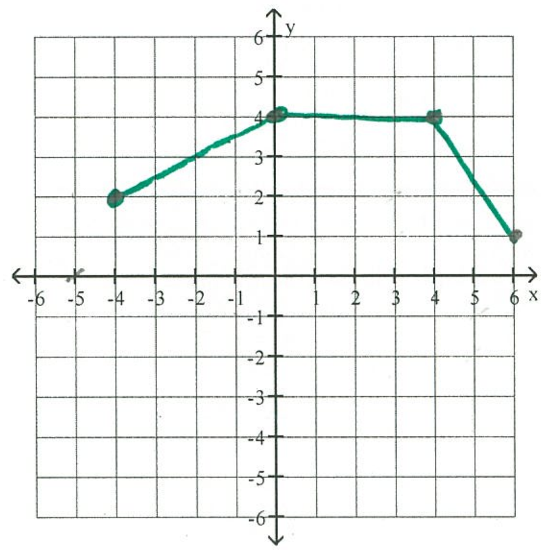
Intervals of x where the function is:

increasing $(-2,-1)$, $(3,\infty)$ decreasing $(-4,-2)$ constant $(-1,2)$, $(2,3)$

17) Given the function $f(x)$ shown below, sketch the graph of the transformation

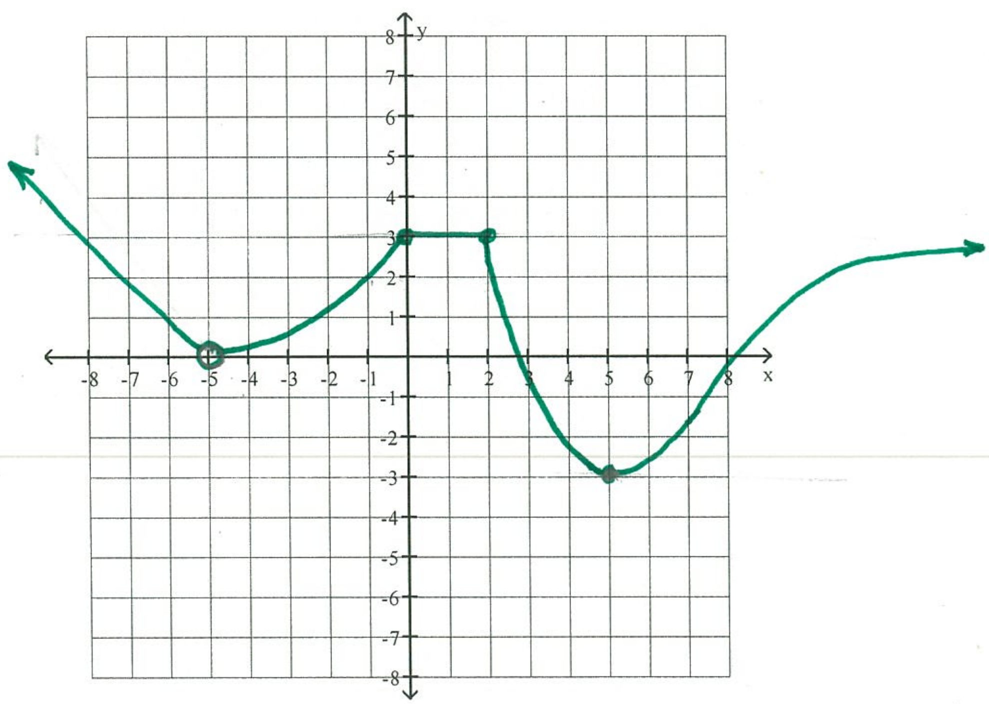
$-1/2\, f(x + 1) + 3$





18) **Use the x–y coordinate system below and draw a graph with the following criteria**

Decreasing on the interval $(-\infty, -5)$ and $(2, 5)$, increasing on the interval $(-5, 0)$ and $(5, \infty)$ and constant on the interval $(0, 2)$. The function has a maximum value of $y = 3$ and minimum values of $y = 0$ and $y = -3$. The function is not continuous.



ONE POSSIBLE GRAPH