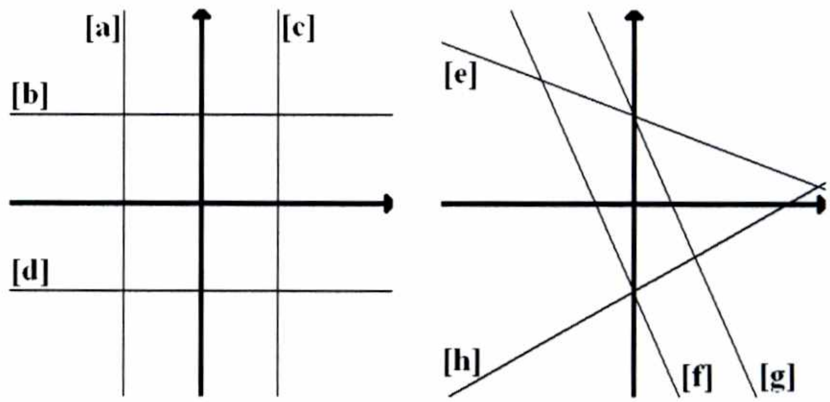
Match the equations of 4 lines (on the right) to the corresponding graphs (on the left). **SCORE: _____ / 10 PTS**
Each equation corresponds to only one graph, so some graphs do **NOT** correspond to any equation.

$y = -2x - 2$ corresponds to graph f

$y = -2$ corresponds to graph d

$y = -\frac{1}{3}x + 2$ corresponds to graph e

$x = 2$ corresponds to graph c



If $f(x) = 1 - 3x - x^2$, find the difference quotient $\dfrac{f(x+h) - f(x)}{h}$. **SCORE: _____ / 14 PTS**

$$\frac{1 - 3(x+h) - (x+h)^2 - (1 - 3x - x^2)}{h}$$

$$= \frac{\cancel{1} - \cancel{3x} - 3h - \cancel{x^2} - 2xh - h^2 - \cancel{1} + \cancel{3x} + \cancel{x^2}}{h}$$

$$= \frac{-3h - 2xh - h^2}{h}$$

$$= -3 - 2x - h$$

Find the domain of $f(x) = \sqrt{4 - |x-2|}$. **SCORE: _____ / 14 PTS**

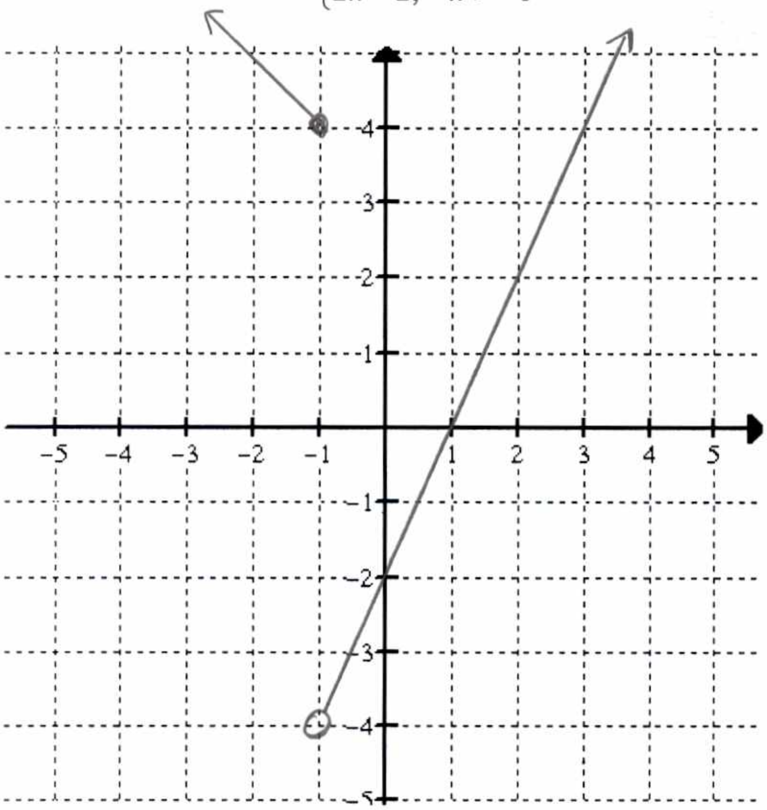
$$4 - |x-2| \geq 0$$

$$|x-2| \leq 4$$

$$-4 \leq x - 2 \leq 4$$

$$-2 \leq x \leq 6$$

Graph the function $f(x) = \begin{cases} 3-x, & x \le -1 \\ 2x-2, & x > -1 \end{cases}$. **SCORE: _____ / 14 PTS**



One night a week for 30 weeks, students in a science class counted the average number of cricket chirps per minute at 11 pm, and noted the outside temperature. Their data fit the linear relationship $T = \frac{1}{4}C + 37$, where T was the temperature in degrees Fahrenheit $(°F)$, and C was the number of cricket chirps per minute. **SCORE: _____ / 10 PTS**

[a] Which one of the following statements about the slope is true ? **Circle the number of the correct answer.**

[1] The slope tells us how much the temperature generally increased for each extra cricket chirp per minute .

[2] The slope tells us, on average, how many extra times per minute the crickets chirped when the temperature increased one degree.

[3] The slope tells us the average rate that the number of cricket chirps increased each week.

[4] The slope tells us the average rate that the temperature increased each week.

[5] Statements [1] through [4] are all false.

[b] Which one of the following statements about the T – intercept is true ? **Circle the number of the correct answer.**

[i] The T – intercept tells us the average number of cricket chirps per minute when the temperature was 0 .

[ii] The T – intercept tells us the temperature when the students started counting the cricket chirps.

[iii] The T – intercept tells us the temperature at which the crickets stopped chirping.

[iv] The T – intercept tells us the temperature at which the crickets were chirping 37 times per minute.

[v] Statements [i] through [iv] are all false.

Determine if the function $f(x) = \dfrac{1-x^4}{x+x^3}$ is even, odd or neither, and describe the symmetry. **SCORE: _____ / 10 PTS**

$$f(-x) = \frac{1-(-x)^4}{(-x)+(-x)^3} = \frac{1-x^4}{-x-x^3} = -\frac{1-x^4}{x+x^3} = -f(x)$$

ODD

SYMMETRY OVER ORIGIN

Consider the function $g(x) = 2\sqrt{-\frac{1}{3}x+1}$. $= 2\sqrt{-\frac{1}{3}(x-3)}$ **SCORE: _____ / 22 PTS**

[a] What parent function f is the graph of g based on ?

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

[b] Describe the sequence of transformations from f to g (in the correct order).

REFLECT HORIZONTALLY OVER y-AXIS

STRETCH VERTICALLY AWAY FROM x-AXIS (FACTOR 2)

STRETCH HORIZONTALLY AWAY FROM y-AXIS (FACTOR 3)

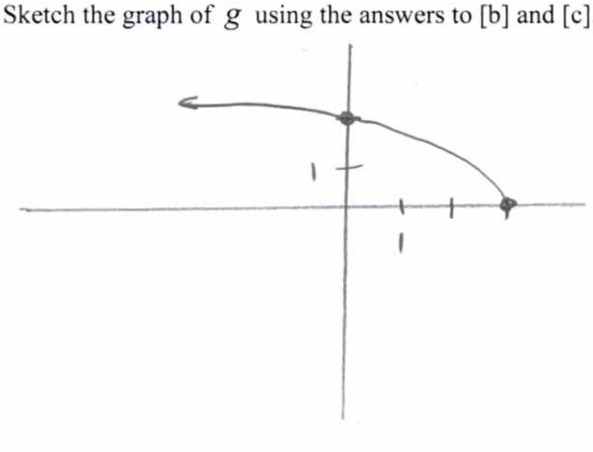
SHIFT RIGHT 3

[c] The points $(0, 0)$ and $(1, 1)$ were on the graph of f. What points on the graph of g were those points transformed into ?

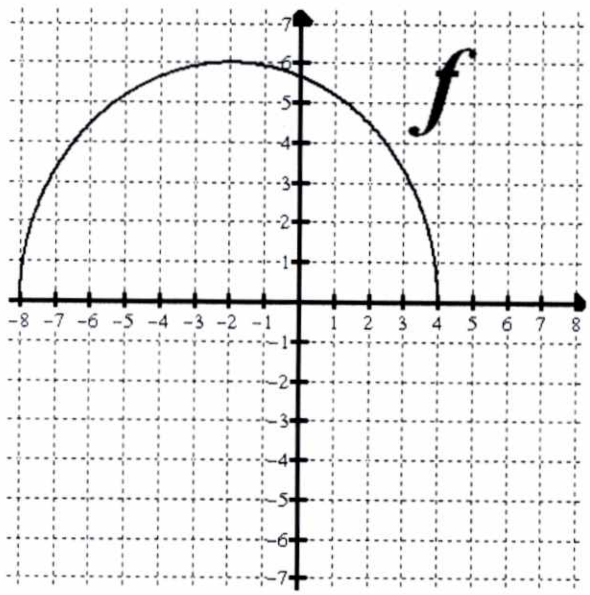
$(0,0) \to (0,0) \to (0,0) \to (0,0) \to (3,0)$

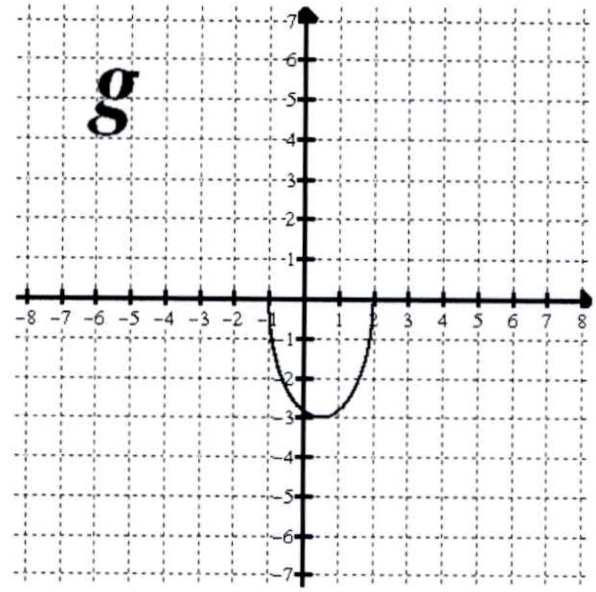
$(1,1) \to (-1,1) \to (-1,2) \to (-3,2) \to (0,2)$

[d] Sketch the graph of g using the answers to [b] and [c]. Label the answers to [c] on the graph.



Consider the functions f and g shown below. **SCORE: _____ / 14 PTS**





[a] Describe the sequence of transformations from f to g (in the correct order).

REFLECT VERTICALLY OVER X-AXIS
REFLECT HORIZONTALLY OVER Y-AXIS
COMPRESS VERTICALLY TOWARDS X-AXIS (FACTOR $\frac{1}{2}$)
COMPRESS HORIZONTALLY TOWARDS Y-AXIS (FACTOR $\frac{1}{4}$)

[b] Use function notation to write g in terms of f.

$g(x) = -\frac{1}{2}f(-4x)$

Write the linear function f such that $f(5) = -3$ and $f(-1) = -7$. **SCORE: _____ / 14 PTS**

$(5, -3) \quad (-1, -7)$

$m = \frac{-7 - -3}{-1 - 5} = \frac{-4}{-6} = \frac{2}{3}$

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

$f(5) = \frac{2}{3}(5) + b$

$-3 = \frac{10}{3} + b$

$-\frac{19}{3} = b$

$f(x) = \frac{2}{3}x - \frac{19}{3}$

Complete the following definition: **SCORE: ______ / 4 PTS**

A function f has a local minimum at $x = a$ if and only if

$f(x) \geq f(a)$ FOR ALL X IN AN INTERVAL AROUND a

If $f(x) = 5 - x$ and $g(x) = 1 + \sqrt{x-2}$, find the value(s) of x for which $f(x) = g(x)$. **SCORE: _____ / 14 PTS**

$$5 - x = 1 + \sqrt{x-2}$$
$$4 - x = \sqrt{x-2}$$
$$16 - 8x + x^2 = x - 2$$
$$x^2 - 9x + 18 = 0$$
$$(x-3)(x-6) = 0$$
$$x = 3 \text{ OR } x = 6$$

CHECK:

$x = 3$: $f(3) = 5 - 3 = 2$

$g(3) = 1 + \sqrt{1} = 2$

$x = 6$: $f(6) = 5 - 6 = -1$

$g(6) = 1 + \sqrt{4} = 3$

$$\boxed{x = 3}$$