MATH 30 - Precalculus. Homework 1. Due We. 02/05/2025. Professor Luis Fernández

SOLUTION

1. For the function $f(x) = 3x - 5$, find (and simplify when possible)

a) $f(3) = 4$ **b)** $f(-4) = -17$ **c)** $f(t) = 3t - 5$

d) $f(x+1) = 3(x+1) - 5 = 3x - 2$ **e)** $f(-x) = -3x - 5$ **f)** $f(x^2) = 3x^2 - 5$

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2. For the function $f(x) = \dfrac{3x^2 - 1}{x^2}$, find (and simplify when possible)

a) $f(2) = \frac{11}{4}$ **b)** $f(-1) = 2$ **c)** $f(r) = \dfrac{3r^2 - 1}{r^2}$

d) $f(x-1) = \dfrac{3(x-1)^2 - 1}{(x-1)^2} = \dfrac{3x^2 - 6x + 2}{(x-1)^2}$ **e)** $f(-x) = \dfrac{3(-x)^2 - 1}{(-x)^2} = \dfrac{3x^2 - 1}{x^2}$ **f)** $f(x^3) = \dfrac{3x^6 - 1}{x^6}$

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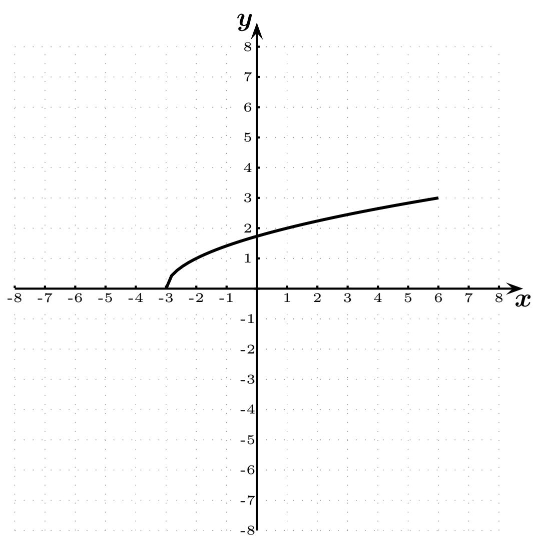
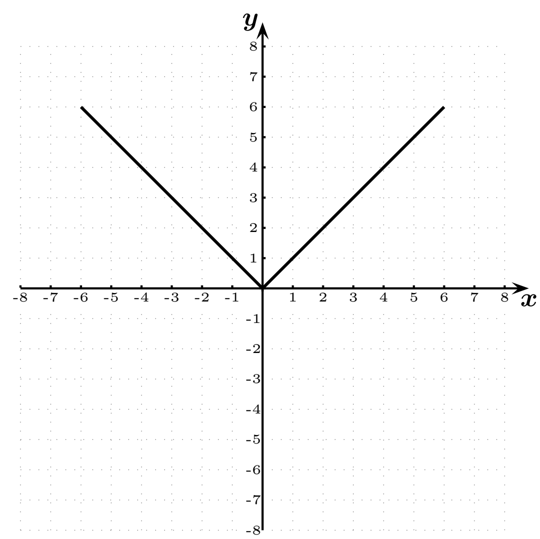
3. Make a table of values (take, for example, the integers between -6 and 6; you may want to use a calculator) and graph the following functions in the axes provided.

a) $f(x) = \sqrt{x+3}$



b) $g(x) = |x|$
(remember that $|x|$ means 'absolute value of x')



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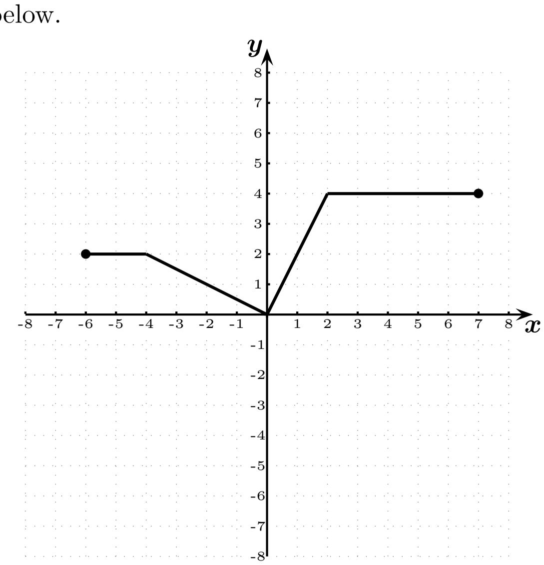
4. Use the given graph of the function g to answer the questions below.



a) Find $g(-2) = 1$ **b)** Find $g(0) = 0$

c) Find $g(1) = 2$ **d)** Find $g(-3) = 1.5$

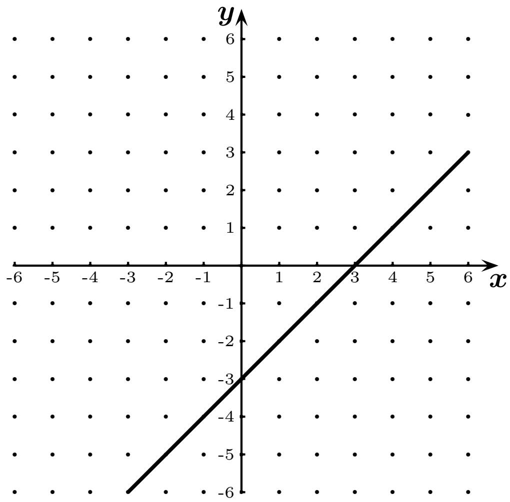
e) Find $g(4) = 4$ **f)** Find $g(7) = 4$

g) Find the domain of g and write it in interval notation.
$[-6, 7]$

h) Find the range of g and write it in interval notation.
$[0, 4]$

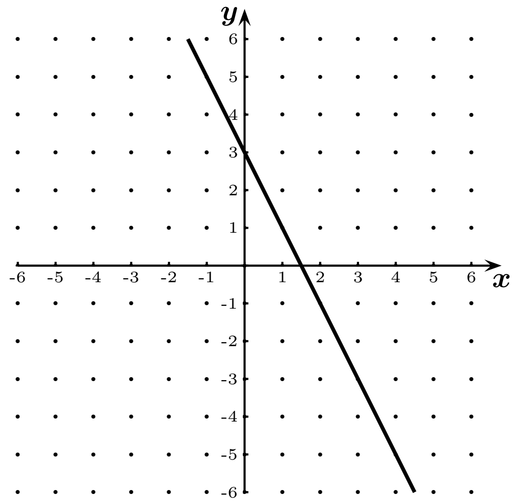
5. Graph the following lines.

Graph $y = x - 3$ indicating at least two points.



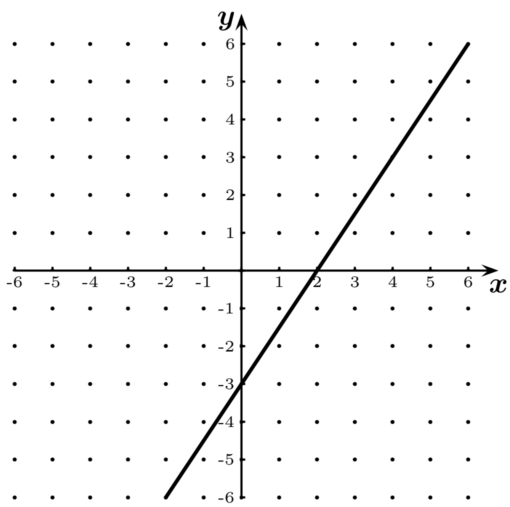
Solution: Two points: $(0, -3)$, $(3, 0)$

Graph $y = -2x + 3$ indicating at least two points.



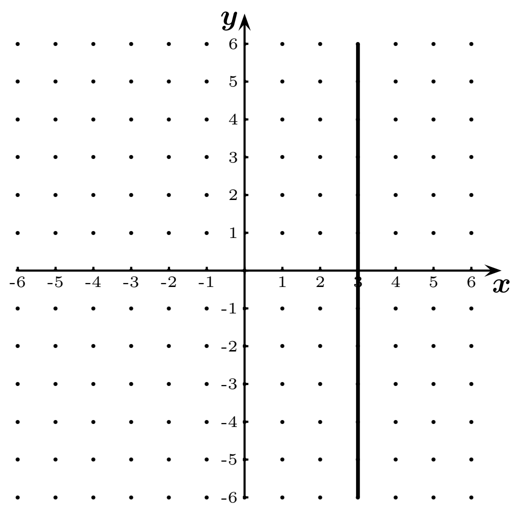
Solution: Two points: $(0, 3)$, $(1, 1)$

Graph $3x - 2y = 6$ indicating at least two points.



Solution: Two points: $(2, 0)$, $(0, -3)$

Graph $x = 3$ indicating at least two points.



Solution: Two points: $(3, -6)$, $(3, 6)$

6. Find the equation of the line passing through the point $(1, 3)$ that is parallel to the line with equation $3x + 2y = 5$.

If the line we want is parallel to $3x + 2y = 5$, it must have the same slope.

To find the slope of $3x + 2y = 5$, solve for y and then the slope will be the coefficient of x: $3x + 2y = 5 \ \rightarrow \ 2y = -3x + 5 \ \rightarrow y = -\frac{3}{2}x + \frac{5}{2}$. Thus the slope (of both lines) is $m = -\frac{3}{2}$.

Therefore the equation of the line we want is $y - 3 = -\frac{3}{2}(x - 1)$ (use point-slope form).

7. Find the equation of the line passing through the point $(-1, 2)$ that is perpendicular to the line with equation $3x + 2y = 5$.

The slope of the line $3x + 2y = 5$ is $m_1 = -\frac{3}{2}$ (done in the previous exercise). The slope of a perpendicular line is the negative, reciprocal, of m_1. Therefore the slope of the line we want is $m_2 = \frac{2}{3}$, and the equation of the line that we want to find is $y - 2 = \frac{2}{3}(x + 1)$.