

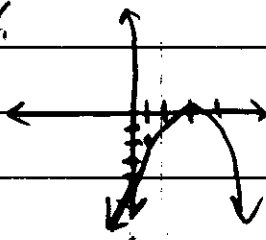
Algebra 3.4 Definition of Functions

EX. $f(x) = 3x - 2$ same as $y = 3x - 2$ so $(x, f(x))$ same as (x, y)

EX Find $f(-2)$ for $f(x) = x^2 - 3x - 5$

$$f(-2) = (-2)^2 - 3(-2) - 5 = 4 + 6 - 5 = 5 \quad f(-2) = 5 \text{ or } (-2, 5)$$

EX.



This is a function because it passes the vertical line test, i.e. vertical line passes through it once and only once

$$\text{Find } f(0) \quad f(0) = -4$$

$$\text{Find } f(1) \quad f(1) = -2$$

$$\text{Find } f(3) \quad f(3) = 0$$

EX Find $g\left(\frac{a}{2}\right)$ for $g(x) = x^3 - 3x$

$$g\left(\frac{a}{2}\right) = \left(\frac{a}{2}\right)^3 - 3\left(\frac{a}{2}\right) = \frac{a^3}{8} - \frac{3a}{2} \quad g\left(\frac{a}{2}\right) = \frac{a^3 - 12a}{8}$$

Domain - is all possible x values that can be used

Range - is all possible y values that can be used

EX Find the domain of $f(x) = \frac{2}{x} \quad x \neq 0 \quad (-\infty, 0) \cup (0, \infty)$

EX Find the domain of $f(x) = \frac{11}{3x^2 - 2x - 5} \quad x \neq -1, \frac{5}{3} \quad (-\infty, -1) \cup (-1, \frac{5}{3}) \cup (\frac{5}{3}, \infty)$

EX Find the domain of $f(x) = \frac{3x}{\sqrt{x-4}} \quad x-4 > 0 \quad x > 4 \quad (4, \infty)$

EX $h(x) = 3\sqrt{x-4} \quad x-4 \geq 0 \quad x \geq 4 \quad [4, \infty)$

EX $f(x) = \frac{7x^2}{(x+3)\sqrt{2-x}} \quad x \neq -3 \quad 2-x > 0 \quad -x > -2 \quad x < 2 \quad (-\infty, 3) \cup (-3, 2)$

EX Find the domain of $\frac{-5x^2}{\sqrt{x^2-9}}$ $x^2-9 > 0$
 $(x+3)(x-3) > 0$

$x-3$	-	-	+
$x+3$	-	+	+
all	⊕	-	⊕
	-3	3	

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

EX Find the domain of $f(x) = \frac{\sqrt{x-2}}{x+5}$ $x-2 \geq 0$ $x \geq 2$
 $x \neq -5$

$[2, \infty)$

EX Find the domain of x^2-3x+4 \mathbb{R}

EX Find the domain of $\frac{1}{x^2-3x-4}$ $\frac{1}{(x-4)(x+1)}$ $x \neq 4, -1$ $(-\infty, -1) \cup (-1, 4) \cup (4, \infty)$

EX $f(x) = \frac{9x}{\sqrt{x^2-4x}} = \frac{9x}{\sqrt{x(x^2-2)}} = \frac{9x}{\sqrt{x(x-2)(x+2)}}$ $x \neq 0, 2, -2$
 $(-2, 0) \cup (2, \infty)$

x	-	-	+	+
$x-2$	-	+	+	+
$x+2$	-	-	-	+
all	-	⊕	-	⊕
	-2	0	2	

EX $g(x) = \sqrt{x^2-4x}$ $[-2, 0] \cup [2, \infty)$

EX if $f(-2) = 7$ and $f(4) = -2$, find the linear function.
 $(-2, 7)$ and $(4, -2)$ $m = \frac{-2-7}{4-(-2)} = \frac{-9}{6} = -\frac{3}{2}$

$y = mx + b$

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

$7 = -\frac{3}{2}(-2) + b$

$7 = 3 + b$ $b = 4$

$y = -\frac{3}{2}x + 4$

$f(x) = -\frac{3}{2}x + 4$ ← function notation

Remember:

For all $\sqrt{\quad}$ we don't want negatives!

For $\sqrt{\quad}$ in the denominator, we don't want 0 or negatives!