

C12 - 3.3 - Factoring Trinomials Notes

$$f(x) = x^2 - 6x + 5$$

Potential Factors: Factors of $c = \pm 5$ and ± 1

$$f(x) = x^2 \dots \dots \dots + 5$$

$\pm 1, 5$

Solve by inspection.

$$f(1) = 1^2 - 6(1) + 5$$

$$f(1) = 0$$

Stop here if you want

$(x - 1)$ is a factor.

$(1, 0)$ $x - \text{int}$

$$f(-1) = (-1)^2 - 6(-1) + 5$$

$$f(-1) = 12$$

$(x + 1)$ is NOT a factor

$(-1, 12)$ (x, y)

$$f(5) = 5^2 - 6(5) + 5$$

$$f(5) = 0$$

$(x - 5)$ is a factor

$(5, 0)$ $x - \text{int}$

$$f(x) = x^2 \dots \dots \dots + 5$$

Examples:

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

$$f(x) = (x + 5)(x + 1)$$

$$(x + a)(x + b) = x^2 \dots + ab$$

x	y
1	0
-1	12
5	0

Do synthetic division with 1

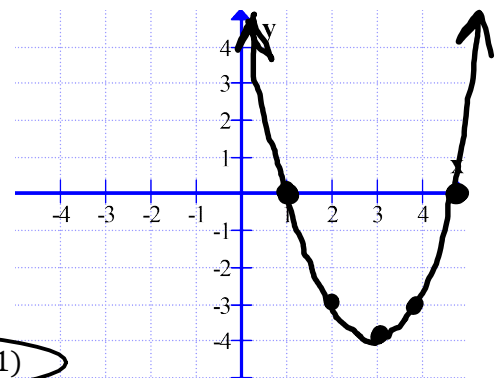
$$\begin{array}{r|rrr} 1 & 1 & -6 & 5 \\ + & & \downarrow & & & \\ & 1 & -5 & 0 & & \end{array}$$

$$x^2 - 6x + 5$$

$$x - 5$$

$$\frac{x^2 - 6x + 5}{x - 1} = x - 5$$

$$x^2 - 6x + 5 = (x - 5)(x - 1)$$



2nd Calc Min/Max*

Or Do synthetic division with 5!

$$\begin{array}{r|rrr} 5 & 1 & -6 & 5 \\ + & & \downarrow & & & \\ & 1 & -1 & 0 & & \end{array}$$

$$x - 1$$

$$\frac{x^2 - 6x + 5}{x - 5} = x - 1$$

$$x^2 - 6x + 5 = (x - 1)(x - 5)$$

Domain

$$x \in \mathbb{R}$$

Range

$$y \geq -4$$



$(x - 1)$ is a factor?

$f(1) = 0$, if you put + 1 in for x it must equal zero, (or it is not a factor)

$(+1, 0)$ is an x -intercept

C12 - 3.3 - Factoring Quadomials Notes

$$f(x) = x^3 + 2x^2 - 5x - 6$$

Potential Factors: Factors of $c = \pm 1, \pm 2, \pm 3, \pm 6$

$$f(x) = x^3 \dots \dots \dots - 6 \quad (\pm 1, 2, 3, 6)$$

Solve by inspection.

Calc
Store x

$$f(1) = (1)^3 + 2(1)^2 - 5(1) - 6$$

$$f(1) = 1 + 2 - 5 - 6$$

$$f(1) = -8 \quad (x - 1) \text{ is NOT a factor}$$

$$f(-1) = (-1)^3 + 2(-1)^2 - 5(-1) - 6$$

$$f(-1) = -1 + 2 + 5 - 6$$

$$f(-1) = 0 \quad (x + 1) \text{ is a factor}$$

$6^3 = 216$, its not going to be 6!

$$f(x) = x^3 \dots \dots - 6$$

Examples:

$$f(x) = (x - 2)(x - 3)(x - 1)$$

$$f(x) = (x + 2)(x + 3)(x - 1)$$

$$f(x) = (x + 2)(x - 3)(x + 1)$$

$(x - a)(x + b)(x - c) = x^3 \dots + abc$

x	y
1	-8
-1	0
6	252

Do synthetic division with -1

-1	1	2	-5	-6
+	↓	-1	-1	6
	1	1	-6	0

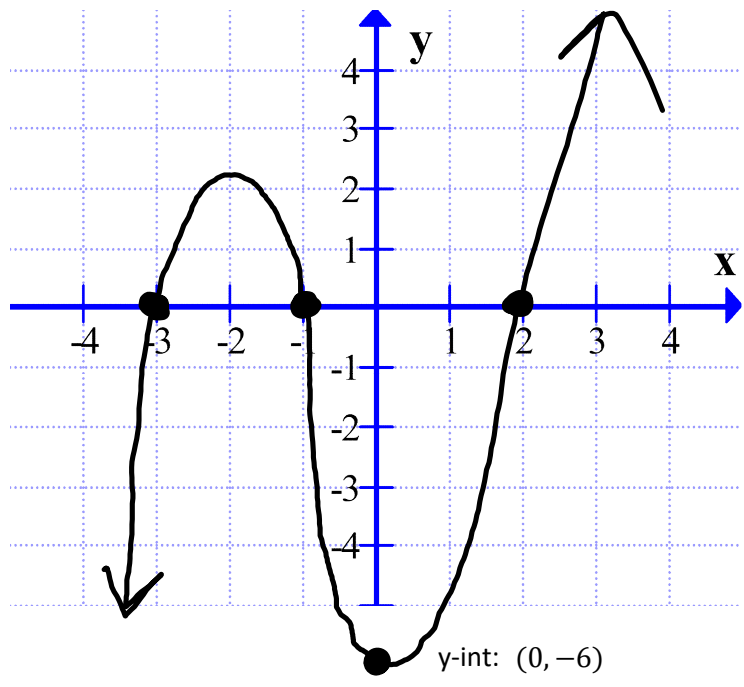
$1x^2 + 1x - 6$
 $(x + 3)(x - 2)$

Factor

$f(x) = (x + 3)(x - 2)(x + 1)$

$f(-3) = 0$
 $f(2) = 0$
 $f(-1) = 0$

Domain	Range
$x \in \mathbb{R}$	$y \in \mathbb{R}$



$x^3 + 2x^2 - 5x - 6 = (x + 3)(x - 2)(x + 1)$

$x^3 + 2x^2 - 5x - 6 > 0 \quad f(x) > 0$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">$-3 < x < -1$</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">$x > 2$</div> </div>	$x^3 + 2x^2 - 5x - 6 < 0 \quad f(x) < 0$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">$-1 < x < 2$</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">$x < -3$</div> </div>
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C12 - 3.3 - Potential Factors Notes $\pm \frac{d}{a}$

$$f(x) = x^3 + x^2 - 8x + 4$$

Potential Factors: $\pm 1, \pm 2, \pm 4$

factors of "d"

Solve by inspection

$$f(1) = (1)^3 + (1)^2 - 8(1) + 4 = -2$$

$(x - 1)$ is NOT a factor

$$f(-1) = (-1)^3 + (-1)^2 - 8(-1) + 4 = 12$$

$(x + 1)$ is NOT a factor

$$f(2) = (2)^3 + (2)^2 - 8(2) + 4 = 0$$

$(x - 2)$ is a factor (2,0)

$$\begin{array}{r|rrrr}
 2 & 1 & 1 & -8 & 4 \\
 + & \downarrow & \nearrow & 2 & 6 & -4 \\
 & 1 & 3 & -2 & 0
 \end{array}$$

$$f(x) = 3x^2 + 5x - 2$$

Potential Factors: $\pm 2, \pm 1, \pm \frac{2}{3}, \pm \frac{1}{3}$

factors of "c"

and $\frac{\text{factors of "c"}}{\text{factors of "a"}}$

Solve by inspection

$$f(-1) = 3(-1)^2 + 5(-1) - 2 = -4$$

$(x + 1)$ is NOT a factor

$$f(1) = 3(1)^2 + 5(1) - 2 = 6$$

$(x - 1)$ is NOT a factor

$$f(2) = 3(2)^2 + 5(2) - 2 = 20$$

$(x - 2)$ is NOT a factor

$$f(-2) = 3(-2)^2 + 5(-2) - 2 = 0$$

$(x + 2)$ is a factor (-2,0)

$$\begin{array}{r|rrr}
 -2 & 3 & 5 & -2 \\
 + & \downarrow & & -6 & 2 \\
 & 3 & -1 & 0
 \end{array}$$