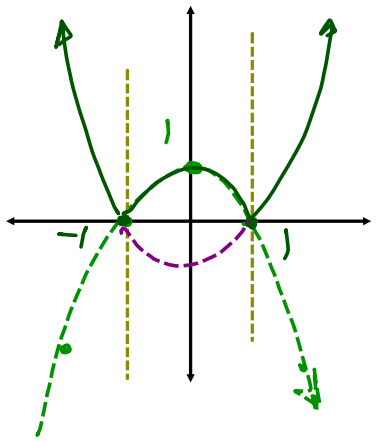


11 c) $y = |-x^2+1|$

consider $f(x) = -x^2+1$

$$|f(x)| = \begin{cases} -x^2+1, & -1 \le x \le 1 \\ -(-x^2+1) = x^2-1, & x>1 \text{ and } x<-1 \end{cases}$$

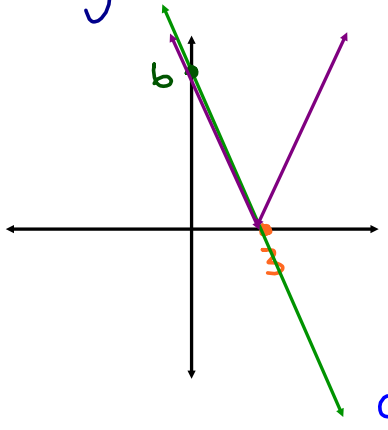
12. $g(x) = |6-2x|$ find x-int: $y=0$

$0 = |6-2x|$

$0 = 6-2x$

$2x = 6$

$x = 3$



$f(x) = 6-2x$

x	f(x)	g(x)
0	6	6
1	4	4
2	2	2
3	0	0
4	-2	2
5	-4	4
		6

same

$$g(x) = \begin{cases} 6-2x, & x \le 3 \\ 2x-6, & x>3 \end{cases}$$

7.3 Absolute Value Equations

$$|f(x)| = \begin{cases} f(x), & f(x) \geq 0 \\ -f(x), & f(x) < 0 \end{cases}$$

* To solve an absolute value equation, you must consider both parts of the equivalent piecewise function and verify your solution

Ex. Solve |x - 5| = 7

case 1: $x - 5 \geq 0$

$x - 5 = 7 \Rightarrow \boxed{x = 12}$ ✓

check: $|12 - 5| = 7$

$|7| = 7$ true

case 2: $x - 5 < 0$

$-(x - 5) = 7$

$-x + 5 = 7$

$-x = 2$

$\boxed{x = -2}$ ✓

check: $|-2 - 5| = 7$

$|-7| = 7$

true

Ex. Solve |2x - 5| = 5 - 3x

case 1: $2x - 5 \geq 0$

$2x - 5 = 5 - 3x$

$5x = 10$

$\cancel{x = 2}$

check: $LS = |2(2) - 5|$

$= |4 - 5|$

$= |-1| = 1$

$RS = 5 - 3(2)$

$= -1 \neq LS$

case 2: $2x - 5 < 0$

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

$-2x + 5 = 5 - 3x$ ✓

$\boxed{x = 0}$

check: $|2(0) - 5| = 5 - 3(0)$

$|-5| = 5$

true

Ex. Solve |2x - 5| + 7 = 3

$|2x - 5| = -4$

It is impossible for $|2x - 5|$ to be negative

∴ there is NO soln

Your turn pg. 383

$|6 - x| = 2$

case 1: $6 - x \geq 0$

$6 - x = 2$

$x = 4$ ✓

check: $|6 - 4| = 2$

$|2| = 2$

true

case 2: $6 - x < 0$

$-(6 - x) = 2$

$-6 + x = 2$

$\boxed{x = 8}$ ✓

$|6 - 8| = 2$

$|-2| = 2$

true

Your turn pg. 384

$|x + 5| = 4x - 1$

case 1: $x + 5 \geq 0$

$x + 5 = 4x - 1$

$-3x = -6$

$\boxed{x = 2}$ ✓

check: $|2 + 5| = 4(2) - 1$

$|7| = 7$

true

case 2: $x + 5 < 0$

$-x - 5 = 4x - 1$

$-5x = 4$

$\cancel{x = -\frac{4}{5}}$

check $\left|-\frac{4}{5} + 5\right| = 4\left(-\frac{4}{5}\right) - 1$

$\left|4\frac{1}{5}\right| \neq -\frac{21}{5}$

Ex. $|x^2 - 7x + 12| = 2$

Case 1: $x^2 - 7x + 12 \geq 0$

$x^2 - 7x + 12 = 2$

$x^2 - 7x + 10 = 0$

$(x-2)(x-5) = 0$

$x = 2$ $x = 5$ check

$|(2)^2 - 7(2) + 12| = 2$ $|(5)^2 - 7(5) + 12| = 2$

$|4 - 14 + 12| = 2$ $|25 - 35 + 12| = 2$

$|2| = 2$ ✓ $|2| = 2$ ✓

$\therefore x = 2$ and $x = 5$

Case 2: $x^2 - 7x + 12 < 0$

$-(x^2 - 7x + 12) = 2$

$-x^2 + 7x - 12 = 2$

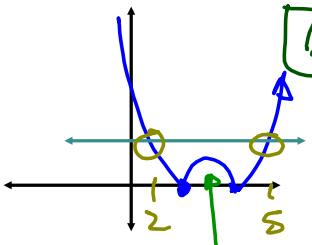
$0 = x^2 - 7x + 14$

can't factor ... check discriminant

$b^2 - 4ac = (-7)^2 - 4(1)(14$

$= 49 - 56$

$\Delta = -7$



no real solns

Your turn pg. 387

$|x^2 - 3x| = 2$

case 1: $x^2 - 3x \geq 0$

$x^2 - 3x = 2$

$x^2 - 3x - 2 = 0$

$(x-2)(x-1) = 0$

$x = 2$ $x = 1$

$|(2)^2 - 3(2)| = 2$ $|(1)^2 - 3(1)| = 2$

$|4 - 6| = 2$ $|1 - 3| = 2$

$|-2| = 2$ ✓ $|-2| = 2$ ✓

2 good answers $x = 2$ $x = 4$

case 2: $x^2 - 3x < 0$

$-(x^2 - 3x) = 2$

$-x^2 + 3x = 2$

$0 = x^2 - 3x + 2$

$0 = (x-2)(x-1)$

$x = 2$ $x = 1$

$|(2)^2 - 3(2)| = 2$ $|(1)^2 - 3(1)| = 2$

$|4 - 6| = 2$ $|1 - 3| = 2$

$|-2| = 2$ ✓ $|-2| = 2$ ✓

2 more answers $x = 2$ $x = 1$

* An expression such as $|x - d|$ represents the distance between x and d. However, solving $|x - 5| = 3$ tells us the numbers which are 3 units from 5... (2 and 8)

Homefun: pg. 389 #2, 4ab, 5abc, 7, 9-11, 13, 15, 22