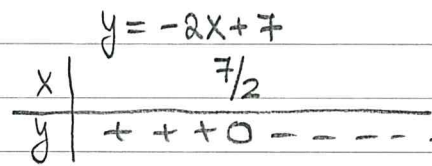
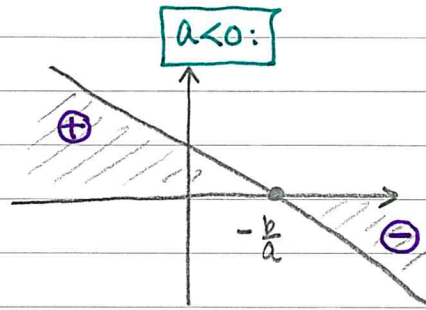
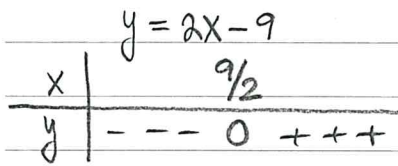
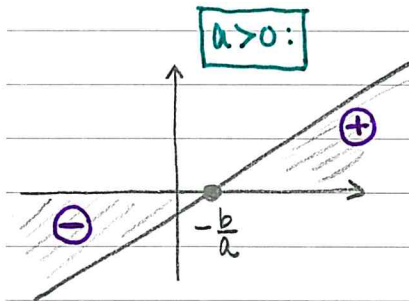


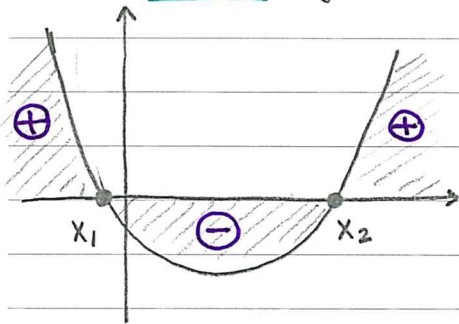
Determining Signs of Functions

* Linear Functions: $y = ax + b$.



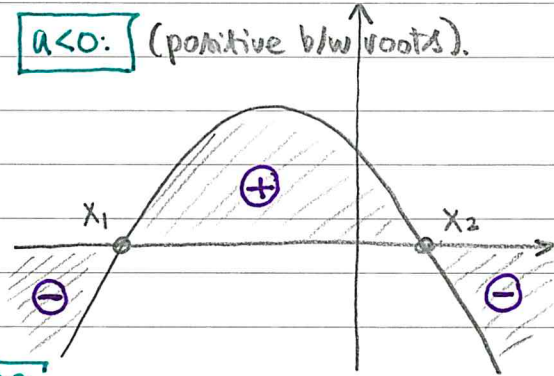
* Quadratic Functions: $y = ax^2 + bx + c$

$a > 0$: (negative b/w roots)



$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a < 0$: (positive b/w roots)



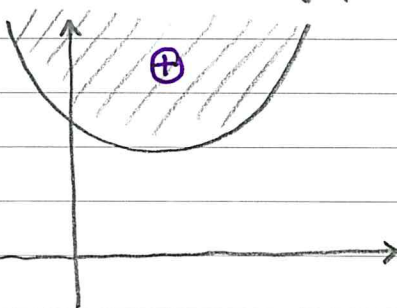
Ex: $y = x^2 - 4x + 2$

$$x_{1,2} = \frac{4 \pm \sqrt{16 - 8}}{2} = \frac{4 \pm 2\sqrt{2}}{2} = 2 \pm \sqrt{2}$$

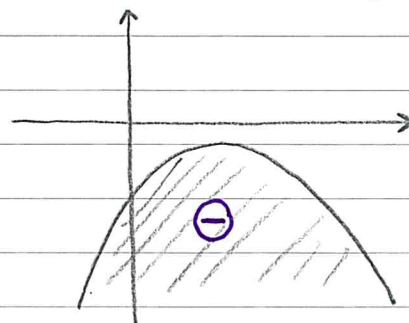
x	$2 - \sqrt{2}$	$2 + \sqrt{2}$
y	+ + 0 - - - - -	- - - - - 0 + +

What if no real roots? ($b^2 - 4ac < 0$)

$a > 0$: (always positive)



$a < 0$: (always negative)



1. $f(x) = 3(2x-8)(x^2-4x+3)$ (always try to factor, if possible)

$= 3(2x-8)(x-3)(x-1)$

Roots: 4, 3, 1

Table:

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

Make sure to order correctly on real line

← Thinking about (x^2-4x+3) as a Quadratic

or:

x	1	3	4
$2x-8$	-	-	-
$x-3$	-	-	+
$x-1$	-	+	+
$f(x)$	-	+	+

← Thinking about (x^2-4x+3) as two factors.

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

Root: $\frac{1}{2}$ Roots: $\frac{5 \pm \sqrt{25-12}}{6} = \frac{5 \pm \sqrt{13}}{6}$

$\frac{1}{2} \boxed{>} \frac{5-\sqrt{13}}{6} \quad | \times 6$ $\frac{1}{2} \boxed{<} \frac{5+\sqrt{13}}{6} \quad | \times 6$

$3 \boxed{>} 5-\sqrt{13}$ $3 \boxed{<} 5+\sqrt{13}$

$\sqrt{13} \boxed{>} 2$

x	$\frac{5-\sqrt{13}}{6}$	$\frac{1}{2}$	$\frac{5+\sqrt{13}}{6}$
$1-2x$	+	+	+
$3x^2-5x+1$	+	+	+
$f(x)$	+	+	+