

Quadratics

How can we solve quadratic equations?

1.

2.

3.

4.

5.

6.

Before solving quadratic equations need to be written as:

$$Ax^2 + Bx + C = 0$$

1.) The formula:

$$\frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

← This part is
the discriminant

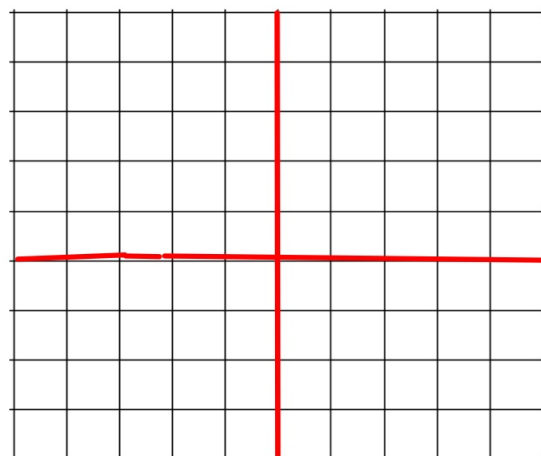
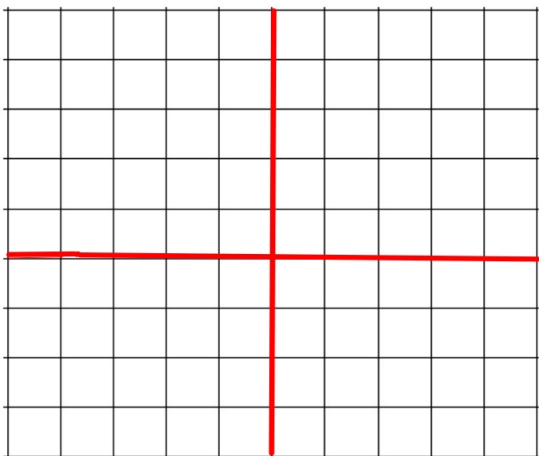
If: $B^2 - 4AC > 0 \Rightarrow 2$ distinct real solutions

$B^2 - 4AC = 0 \Rightarrow 1$ real solution

$B^2 - 4AC < 0 \Rightarrow 0$ real solutions

eg. Find the values for k for which $x^2 + kx = -9$
has 2 real solutions

The discriminant and graphing



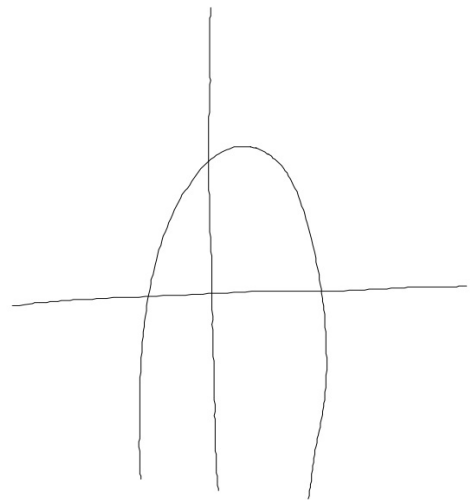
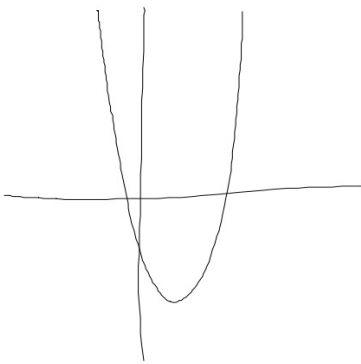
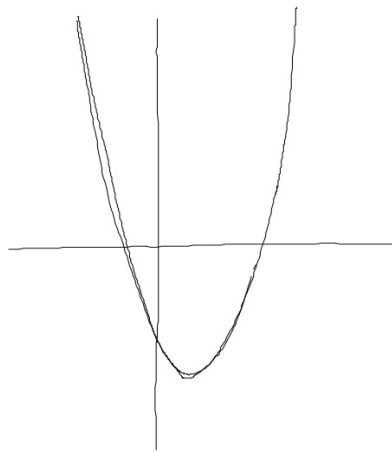
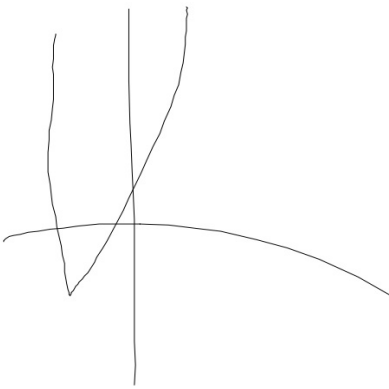
Sketching a Quadratic

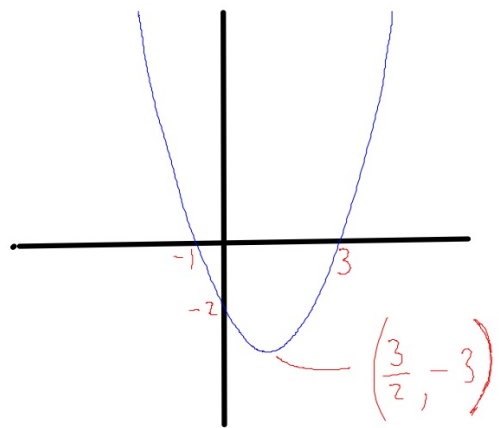
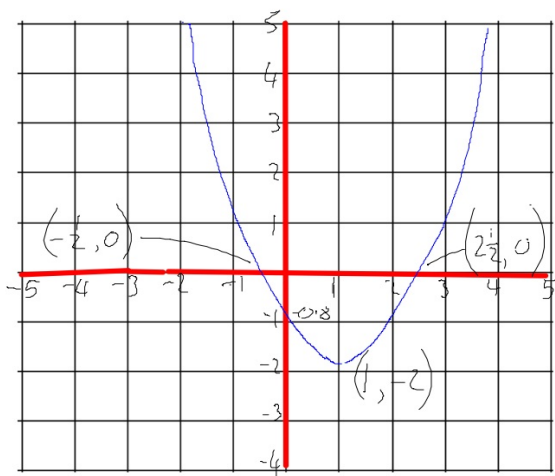
- 1) x - intercepts (if they exist)
- 2) y - intercept
- 3) Turning point.

How can we find the turning point?

What's a good/bad/terrible sketch?

1)





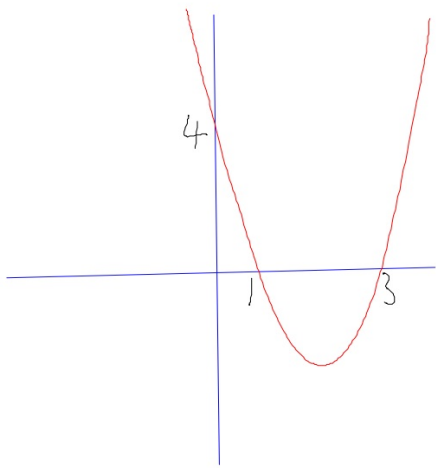
Sketch:

$$1) y = x^2 - 3x - 10$$

$$2) y = x^2 - 4x + 7$$

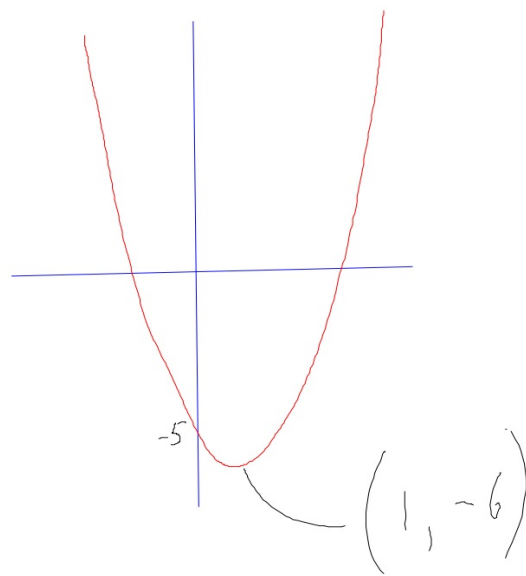
$$3) y = 2x^2 - 6x + 5$$

Finding the Equation

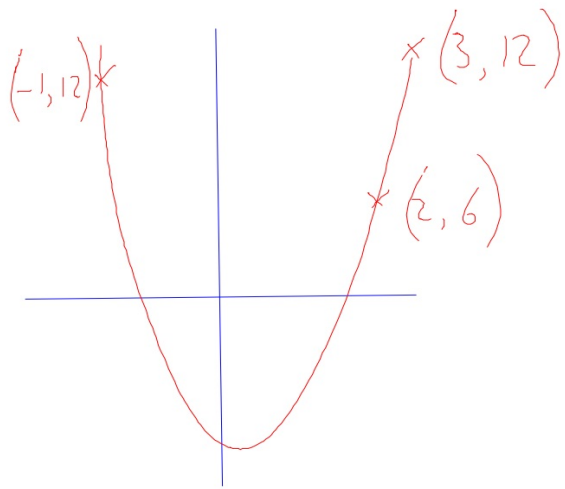


$$y = k(x-1)(x-3)$$

Substitute in $x=0, y=4$
to find k



$$y =$$



Find the Equation

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Q 5, 9

Quadratic Inequalities

Solve:

$$1) x^2 - 6x + 8 > 0$$

$$2) 2x^2 + 5x - 3 \leq 0$$

$$3) x^2 - 3 < 2x$$

$$4) |x| < 2 - x^2 + 2x$$

Simultaneous Equations

Solve: $y = x^2 + 3x - 6$

$$y = 2x - 4$$

Can solve graphically (use interest)
or algebraically.

$$x^2 + 3x - 6 = 2x - 4$$

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

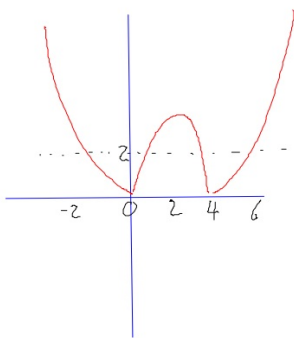
What would the discriminant tell us here?

p.61 2.4.3
Qs 3a, 3c, 6, 7, 8, 9

Qs page 65/66

Page 61 Ex 2.4.3 Q 7A

$$|x^2 - 4x| < k$$



$$|x^2 - 4x| < 2$$

We consider: $x^2 - 4x = 2$ or -2

$$x^2 - 4x = 2$$

$$x^2 - 4x - 2 = 0$$

Use complete the square or formula

$$x = \pm\sqrt{6} + 2$$

$$x^2 - 4x = -2$$

$$x^2 - 4x + 2 = 0$$

$$x = 2 \pm \sqrt{2}$$

So, for $|x^2 - 4x| < 2$

from the graph we have:

$$\left\{ x : 2 - \sqrt{6} < x < 2 + \sqrt{2} \right\}$$

and (U)

$$\left\{ x : 2 + \sqrt{2} < x < 2 + \sqrt{6} \right\}$$

9a(i) (Page 61).

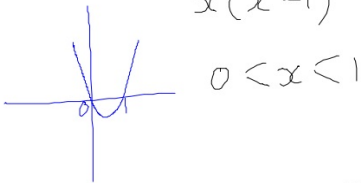
$$2|x| + 1 < 3 - 2(x-k)^2$$

When $k=1$

$$2|x| + 2(x-1)^2 < 2$$

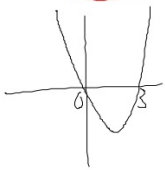
$$|x| + (x-1)^2 < 1$$

When $x \geq 0$ $x + x^2 - 2x + 1 < 1$
 $x(x-1) < 0$



When $x < 0$ $-x + (x-1)^2 < 1$

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



$$\left\{ x : 0 < x < 1 \right\}$$

for ii) $|x| + (x+1)^2 - 1 < 0$
 $k=-1$

We have $x \geq 0$ gives: $-3 \leq x \leq 0$

and $x < 0$, $-x + (x^2 + 2x + 1) - 1 < 0$
 $-1 < x < 0$