

The Discriminant of the Quadratic Formula

May 7/2010

Find the zeroes for each of the following using the quadratic formula:

(a)  $y = x^2 - 6x + 7$

(b)  $y = x^2 - 6x + 9$   $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(c)  $y = x^2 - 6x + 11$

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(a)  $y = x^2 - 6x + 7$

$$\begin{array}{l} a = 1 \\ b = -6 \\ c = 7 \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(7)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{36 - 28}}{2}$$

$$= \frac{6 \pm \sqrt{8}}{2}$$

$$x = \frac{6 + \sqrt{8}}{2} \quad \text{or} \quad x = \frac{6 - \sqrt{8}}{2}$$

when the value under the  $\sqrt$  is positive, we have two solutions

$$x = 4.4$$

$$x = 1.6$$

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(b)  $y = x^2 - 6x + 9$

$$\begin{aligned}a &= 1 \\b &= -6 \\c &= 9\end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(9)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{36 - 36}}{2}$$

$$= \frac{6 \pm \sqrt{0}}{2}$$

$$= \frac{6}{2}$$

$$\boxed{x = 3}$$

when value under  $\sqrt{\phantom{x}}$   
is zero, we have  
one solution/zeros.

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(c)  $y = x^2 - 6x + 11$

$$\begin{aligned}a &= 1 \\b &= -6 \\c &= 11\end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(11)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{36 - 44}}{2}$$

$$= \frac{6 \pm \sqrt{-8}}{2}$$

no solutions

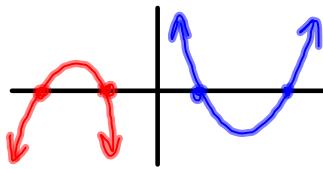
when the value  
under the  $\sqrt{\phantom{x}}$   
is negative,  
there are  
no solutions

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$b^2 - 4ac$  is called the discriminant.

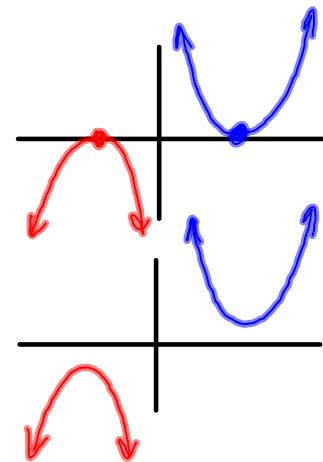
It tells you how many zeroes the quadratic has.

$b^2 - 4ac > 0$  two real roots

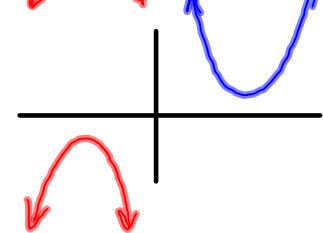


$b^2 - 4ac = 0$  one real root  
(double root)

$$y = a(x-h)^2$$



$b^2 - 4ac < 0$  no real roots



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### Assigned Work:

p. 403 # 5

(use discriminant  
for all)

Nov 14 - 11:15 PM