MATHEMATICS TIPS (SEPTEMBER 2019)

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In the quadratic formula, $x = \frac{- \pm \sqrt{^2 - 4}}{2}$, b^2 - 4ac is called the discriminant. The discriminant can be use to determine the nature of the roots of a quadratic equation.

Given $ax^2 + bx + c = 0$

(1) if $b^2 - 4ac > 0$, then the equation will have 2 real roots.

Find the discriminant of $x^2 + 6x + 8 = 0$.

$b^2 - 4ac = 6^2 - 4(1)(8) = 36 - 32 = 4$

Since the discriminant is greater then 0, there are 2 real roots.

(2) if $b^2 - 4ac = 0$, then the equation will have 1 real root.

Find the discriminant of $x^2 - 6x + 9 = 0$.

$b^2 - 4ac = (-6)^2 - 4(1)(9) = 36 - 36 = 0$

Since the discriminant is equal to 0, there is 1 real root.

(3) If $b^2 - 4ac < 0$, then the equation will have 0 real roots. There are 2 imaginary roots.

Find the discriminant of $x^2 + 5x + 7 = 0$.

$b^2 - 4ac = 5^2 - 4(1)(7) = 25 - 28 = -3$

Since the discriminant is , less than 0, there are 0 real roots. In fact there are 2 imaginary roots.

When solving for an exponent, try and see if you can rewrite the equation so that both bases are equal.

4. $27^x = 9$; $x =$ _____.

Rewrite the equation so that the bases are equal.

$$\left(3^3\right)^x = 3^2 \quad ; \quad 3^{3x} = 3^2$$

Since the bases are equal, that means that the exponents are also equal.

$$3x = 2 \; ; \; x = \frac{2}{3}$$

If the base is a base 10 number, use common logarithms when solving for the exponent.

5. $29^x = 900$

$\text{Log}(29^x) = \text{Log}(900)$

$x\text{Log}(29) = \text{Log}(900)$

$x =$ which is approximately equal to 2.02.