

The Discriminant of $ax^2 + bx + c = 0$

Date: _____

In the quadratic formula the roots are always described by

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

$b^2 - 4ac$ without the root sign is called the discriminant of a quadratic equation. The quantity of this value has implication for the following:

- A) nature of the roots of $ax^2 + bx + c = 0$
- B) the number of x intercepts to $y = ax^2 + bx + c$

Ex) Find the zeroes to each of the following Quadratic functions. Record the value of the discriminant for each equation. Sketch each graph in your calculator and record the number of x intercepts.

a) $y = 2x^2 - 7x + 6$ b) $y = x^2 - 12x + 36$ c) $y = 4x^2 - x + 3$

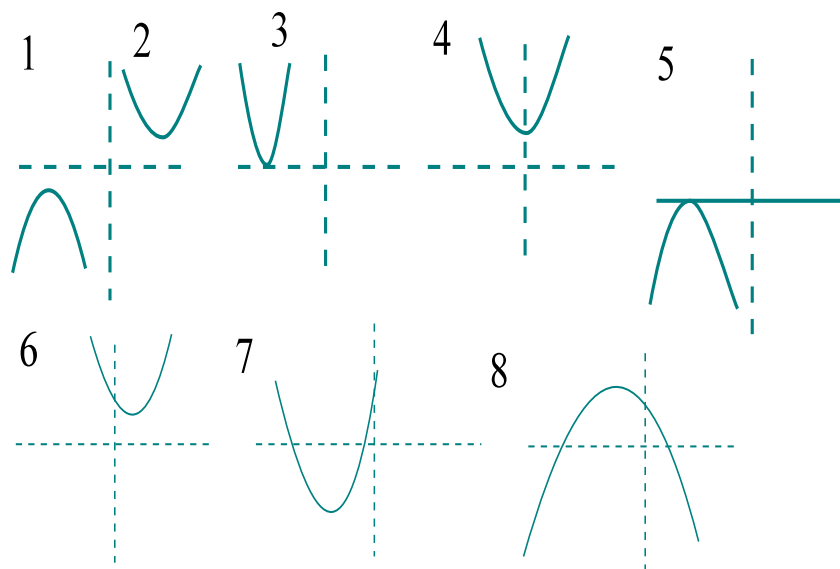
roots:

Number of X intercepts

YOU MUST MEMORIZE THIS TABLE

Value of the discriminant for $ax^2+bx + c = 0$	Nature of the Roots	Number of x-intercepts to the graph of $y = ax^2+bx + c$
$D < 0$	Non Real roots. They are unequal and involve imaginary numbers for solutions. (Numbers involving I)	NONE The parabola never touches the x-axis.
$D = 0$ $b^2 - 4ac$	Roots are Real and Equal . One root is repeat twice. It is called a double root. (No I numbers)	One x-intercept The parabola is tangent to the x axis. It touches the x axis only once . The vertex is sitting or hanging on the x axis
$D > 0$	Roots are real and unequal . There are two distinct real roots (No I numbers)	2 x intercepts

Situation: Identify a possible value for the discriminant of $y = ax^2 + bx + c$, the nature of the roots, the number of x-intercepts.



Ex) Determine the value of the discriminant for each equation. Use it to describe the roots as real or imaginary and equal or unequal.

A) $5x^2 - 6x + 3 = 0$ B) $10x^2 - 5x - 7 = 0$

C) $x^2 - 14x = 49$ D) $\frac{1}{2}x^2 - 6x + 3 = 0$

E) $9x^2 - 12x + 1 = 0$ F) $-x + 7x^2 + 1 = 0$

G) $6x^2 = x - 11$ H) $3 - x = 4x^2$

I) $(x - 1) = \frac{3}{x}$