



Discriminants ($b^2 - 4ac$)



1. Analyse the following equations and state whether each equation has:
 - 2 real distinct roots
 - Equal roots
 - Imaginary roots
 - i. $x^2 + 5x + 4 = 0$
 - ii. $x^2 - 10x + 25 = 0$
 - iii. $x^2 + 2x + 5 = 0$
 - iv. $2x^2 + 5x + 3 = 0$
 - v. $3x^2 - 12x + 12 = 0$
 - vi. $3x^2 + 2x + 7 = 0$
 - vii. $x^2 - 2px - q^2 = 0$
 - viii. $4x^2 - 8kx + 4k^2 = 0$
 - ix. $2x^2 + (k - 3)x - 10 = 0$
2. For what value of k does the equation $x^2 + 6x + k = 0$ have **equal** roots?
3. For what values of k does the equation $x^2 + kx + 4 = 0$ have equal roots?
4. For what values of k does the equation $x^2 + (3k - 2)x + k + 1 = 0$ have equal roots?
5. For what range of values of k does the equation $x^2 + (k + 1)x + k + 1 = 0$ have **real** roots?
6. For what range of values of p does the equation $p^2x^2 + (2p + 2)x + 4 = 0$ have real roots?
7. For what range of values of p does the equation $(p + 3)x^2 + (p + 3)x + 1 = 0$ have **imaginary** roots?

