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## Examples on the Nature of Roots of a Quadratic Equation

Find the value of  $k$  for which

$x^2 - 4x + 1 = 0$ has equal roots	$x^2 + 6x + k = 0$ has no real roots	$x^2 + kx + 9 = 0$ has different roots
$b^2 - 4ac = 0$	$b^2 - 4ac < 0$	$b^2 - 4ac > 0$
$\therefore (-4)^2 - 4(k)(1) = 0$	$\therefore (6)^2 - 4(1)(k) < 0$	$\therefore (k)^2 - 4(1)(9) > 0$
$\therefore 4k = 16 \Rightarrow k = 4$	$\therefore 36 < 4k$	$\therefore k^2 - 36 > 0$
When $k = 4$	$\therefore k > 9$	$\therefore k < -6$ or $k > 6$
$x = \frac{4 \pm \sqrt{0}}{2(4)}$		
$x = \frac{1}{2}$		
 $y = kx^2 - 4x + 1$	 $y = x^2 + 6x + k$	 $y = x^2 + kx + 9$

Additional notes for the third column:  $\therefore (k-6)(k+6) > 0$  CV's  $k = \pm 6$

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