Discriminants and Roots of Quadratic Equations

1. Given that the equation $kx^2 - 4x + k - 3 = 0$ has equal roots, find the values of k.

2. Given that the equation $kx^2 - 4x + (k - 3) = 0$ has real roots, show that $k^2 - 3k - 4 \leq 0$

   Find the range of k values that satisfy the inequality.

3. Show that the equation $x^2 + (2k + 1)x + (k^2 + k + 1) = 0$ has no real roots for any k value.

4. Find the range of values of k for which the quadratic equation $3x^2 + 2x - k = 0$ has 2 distinct real roots.

5. Find the range of values of m for which the quadratic equation $3x^2 - 6x + m = 0$ has no real roots.

6. If the equation $(3k - 2)x^2 + 8x + k = 0$ has no real roots, show that $3k^2 - 2k - 16 > 0$

   Find the range of k values that satisfy the inequality.

7. Given that $k \neq -1$, show that the quadratic equation $(k + 1)x^2 + 2kx + (k - 1) = 0$ has two distinct real roots.

8. Find the range of values of k for which the quadratic equation $kx^2 + 3x - 5 = 0$ has no real roots.

9. Find the range of values of k for which the quadratic equation $2x^2 + kx + 18 = 0$ has no real roots.

10. Given that the equation $2x^2 + (3k - 1)x + (3k^2 - 1) = 0$ has two distinct real roots, show that $5k^2 + 2k - 3 < 0$. Find the range of k values that satisfy the inequality.