Discriminant and the nature of roots

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

1. How many real roots has $x^2 - 7x + 10 = 0$? [2 marks]

The discriminant is $49 - 40 = 9$, positive.

Answer: Two distinct real roots.

2. How many real roots has $3x^2 + 2x + 4 = 0$? [2 marks]

The discriminant is $4 - 48 = -44$.

Answer: No real roots.

3. Find k for a repeated root in $x^2 + 8x + k = 0$. [2 marks]

Set $64 - 4k = 0$.

Solve for k.

Answer: $k = 16$

4. For which real k does $x^2 + 2x + k = 0$ have two distinct real roots? [3 marks]

Require $4 - 4k > 0$.

Rearrange the inequality.

Answer: $k < 1$

5. Find k for a repeated root in $x^2 + kx + 9 = 0$. [3 marks]

Require $k^2 - 36 = 0$.

Keep both square-root branches.

Answer: $k = -6$ or 6.

6. Classify $kx^2 + 2x + 1 = 0$ at $k = 1$ and at $k = 0$. [3 marks]

At 1, the discriminant is zero.

At 0, the coefficient of x^2 vanishes.

Answer: $k = 1$: repeated root -1; $k = 0$: linear equation with root $\frac{-1}{2}$.