



CAMI Mathematics: Grade 11

GRADE 11_Nature of roots

11.4 Nature of roots

1. Calculate the discriminant

(a) $f(m) = -2m^2 + 8$

(b) $f(z) = z^2 + z - 2$

(c) $f(r) = 2r^2 - r + 4$

(d) $f(x) = -3x^2 + 12x - 12$

(e) $f(v) = 3v^2 - 6v$

2. Determine the nature of the roots without solving the equation

(a) $f(n) = -2n^2 + n - 3$

(b) $f(m) = -2m^2$

(c) $f(w) = 2w^2 - 5w - 3$

(d) $f(r) = 3r^2 + 6r$

(e) $f(x) = -x^2 - 1$



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MEMO

1. Calculate the discriminant [5.4.1.1]

(a) $f(m) = -2m^2 + 8$

$$\begin{aligned}b^2 - 4ac \\= 0^2 - 4(-2)(8) \\= 64\end{aligned}$$

(b) $f(z) = z^2 + z - 2$

$$\begin{aligned}b^2 - 4ac \\= (1)^2 - 4(1)(-2) \\= 9\end{aligned}$$

(c) $f(r) = 2r^2 - r + 4$

$$\begin{aligned}b^2 - 4ac \\= (-1)^2 - 4(2)(4) \\= -31\end{aligned}$$

(d) $f(x) = -3x^2 + 12x - 12$

$$\begin{aligned}b^2 - 4ac \\= (12)^2 - 4(-3)(-12) \\= 0\end{aligned}$$

(e) $f(v) = 3v^2 - 6v$

$$\begin{aligned}b^2 - 4ac \\= (-6)^2 - 4(3)(0) \\= 36\end{aligned}$$



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2. Determine the nature of the roots without solving the equation [5.4.1.2]

(a) $f(n) = -2n^2 + n - 3$

$$\begin{aligned}b^2 - 4ac \\= (1)^2 - 4(-2)(-3) \\= -23 \\∴ \text{non real roots}\end{aligned}$$

(b) $f(m) = -2m^2$

$$\begin{aligned}b^2 - 4ac \\= (0)^2 - 4(-2)(0) \\= 0 \\∴ \text{real, equal rational roots}\end{aligned}$$

(c) $f(w) = 2w^2 - 5w - 3$

$$\begin{aligned}b^2 - 4ac \\= (-5)^2 - 4(2)(-3) \\= 49 \\∴ \text{real, unequal rational roots}\end{aligned}$$

(d) $f(r) = 3r^2 + 6r$

$$\begin{aligned}b^2 - 4ac \\= (6)^2 - 4(3)(0) \\= 36 \\∴ \text{real, unequal rational roots}\end{aligned}$$

(e) $f(x) = -x^2 - 1$

$$\begin{aligned}b^2 - 4ac \\= (0)^2 - 4(-1)(-1) \\= -4 \\∴ \text{non real roots}\end{aligned}$$