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

MEMO

1. Calculate the discriminant [5.4.1.1]

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

$b^2 - 4ac$
$= 0^2 - 4(-2)(8)$
$= 64$

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

$b^2 - 4ac$
$= (1)^2 - 4(1)(-2)$
$= 9$

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

$b^2 - 4ac$
$= (-1)^2 - 4(2)(4)$
$= -31$

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

$b^2 - 4ac$
$= (12)^2 - 4(-3)(-12)$
$= 0$

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

$b^2 - 4ac$
$= (-6)^2 - 4(3)(0)$
$= 36$

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

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

$b^2 - 4ac$
$= (1)^2 - 4(-2)(-3)$
$= -23$
$\therefore$ non real roots

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

$b^2 - 4ac$
$= (0)^2 - 4(-2)(0)$
$= 0$
$\therefore$ real, equal rational roots

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

$b^2 - 4ac$
$= (-5)^2 - 4(2)(-3)$
$= 49$
$\therefore$ real, unequal rational roots

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

$b^2 - 4ac$
$= (6)^2 - 4(3)(0)$
$= 36$
$\therefore$ real, unequal rational roots

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

$b^2 - 4ac$
$= (0)^2 - 4(-1)(-1)$
$= -4$
$\therefore$ non real roots