

Lecture Notes on Transformation of Equations

Reference: Techniques of Mathematical Analysis by C.J. Tranter pp.121-pp.138

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I Roots with changed sign.

Theory Let α be a root of a polynomial equation $f(x) = 0$, then $-\alpha$ is a root of a polynomial equation $f(-y) = 0$.

That is to say, change $x \rightarrow -y$

Class Work I.1

Given the quadratic equation $x^2 - x - 6 = 0$

The roots are _____, _____.

The new equation whose roots are $-3, 2$ are _____ = 0

Class work I.2

Let α, β and γ be the roots of $x^3 - x + 1 = 0$. Find the value of $(2 + \alpha)(2 + \beta)(2 + \gamma)$.

The new equation whose roots are $-\alpha, -\beta$ and $-\gamma$ is _____ = 0,

which is equivalent to $(y + \alpha)(y + \beta)(y + \gamma) = 0$

$$\therefore (y + \alpha)(y + \beta)(y + \gamma) = y^3 - y - 1$$

Put $y = 2$, then $(2 + \alpha)(2 + \beta)(2 + \gamma) = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$