P.O.C.A. WONG SIU CHING SECONDARY SCHOOL
PURE MATHEMATICS
ALGEBRA : THEORY OF EQUATIONS
ASSIGNMENT 7

Date	Name	Grade / Score
		/15

1. Let $f(x) = x^4 + 8x^3 + 23x^2 + 26x + 7$ and $g(x) = f(x+k)$ where $k \in \mathbf{R}$. (9 marks)

(a) Find k such that the coefficient of x^3 in $g(x)$ is zero. Find also $g(x)$.

(b) Suppose $g(x) = (x^2 + px + q)(x^2 + rx + s)$ where $p, q, r, s \in \mathbf{R}$.
By comparing coefficients or otherwise, show that $p^6 - 2p^4 + 5p^2 - 4 = 0$.
Hence find p, q, r, s.

(c) Find all the roots of $f(x)=0$.

2. Let $f(x)=a_0x^n+a_1x^{n-1}+\cdots+a_{n-1}x+a_n\ (a_0\neq 0)$ be a polynomial with integral coefficients. (6 marks)

(a) If d is an integral root of the polynomial $f(x)$, show that for any integer m, $m-d$ is a factor of $f(m)$.
(Hint : $f(m)=f(m)-f(d)$).

(b) Use (a) to show that if $f(0)$ and $f(1)$ are both odd numbers, then $f(x)$ has no integral root