

MATH4.1EL Quiz 2
Quadratic Equations in One Unknown
Time Limit: (40 minutes)

T Yeung

Answer the questions in the spaces provided on the question sheets. If you do not know how to answer a certain question, write down where you get stuck. Answers can be corrected to 3 significant figures if necessary.

Name, class, class no.: _____

Tutor's name: _____

1. (3 points) (a) (1 point) Solve the quadratic equation $x^2 + 3x + 2 = 0$
(b) (2 points) Hence, solve the quadratic equation $2x^2 + 3x + 1 = 0$
2. (12 points) (a) Let α, β be the roots of $x^2 + px + q = 0$ (*), where p and q are constants. Find, in terms of p and q .
 - i. (2 points) $\alpha^2 + \beta^2$
 - ii. (2 points) $\alpha^3 + \beta^3$
 - iii. (2 points) $(\alpha^2 - \beta - 1)(\beta^2 - \alpha - 1)$.(b) (2 points) If the square of one root of (*) minus the other root equals 1, use (a), or otherwise, to show that $q^2 - 3(p-1)q + (p-1)^2(p+1) = 0$ (**)
(c) (2 points) Find the range of values of p such that the quadratic equation (**) has real roots.
(d) (2 points) Suppose k is a real constant. If the square of one root of $4x^2 + 5x + k = 0$ minus the other root equals 1, use the result in (b), or otherwise, to find the value of k .
3. (4 points) The quadratic equation $9x^2 - (k+1)x + 1 = 0$ (*) has equal roots.
 - (a) Find the two possible values of the constant k .
 - (b) If k takes the negative value obtained, solve equation (*).
4. (4 points) α and β are the roots of the quadratic equation $kx^2 - 4x + 2k = 0$, where $k(k \neq 0)$ is a constant. Express the following in terms of k .
5. (4 points) The equation $x^2 + 4x + p = 0$, where p is a real constant, has distinct real roots α and β .
 - (a) Find the range of values of p
 - (b) If $\alpha^2 + \beta^2 + \alpha^2\beta^2 + 3(\alpha + \beta) - 19 = 0$, find the values of p .