



Algebra & Functions (Maths 201–016)

(Marks)

Show your work—**justify** all your answers. Just having the correct answer is not sufficient.
Pace yourself—a rough guide is to spend not more than 2m minutes on a question worth m marks.

(3) 1. Solve the system by the method of elimination: $\begin{cases} 3x - 2y = 7 \\ 5x - 4y = 3 \end{cases}$

(3) 2. Solve the system by the method of substitution: $\begin{cases} -x + 3y = 7 \\ 3x + 2y = 1 \end{cases}$

(2×1) 3. Given points $A(2, 5)$, $B(3, -2)$, $C(-1, 3)$:

(a) find the distance between A and B . (Give your answer as an exact square root, and simplify.)

(b) find the midpoint of the line joining B and C ;

(3×1) 4. Simplify each expression:

(a) $2\sqrt{45} - 3\sqrt{20}$ (b) $8\sqrt{\frac{36}{16}}$ (c) $\frac{\sqrt{27} - \sqrt{12}}{\sqrt{15}}$

(3×2) 5. Rationalize the denominator (give your answer simplified):

(a) $\frac{2\sqrt{50}}{5\sqrt{16}}$ (b) $\frac{8}{3 - \sqrt{5}}$ (c) $\frac{3}{\sqrt{12} - \sqrt{3}}$

(3 × 3) 6. Factor completely:

(a) $xy + 2x - y - 2$ (b) $2x^6 + 54x^3$ (c) $3a^3 - 75ab^2$

For the following questions, write “DNE” if no real solution is possible.

(2 × 3) 7. Solve the following equations by completing the square:

(a) $x^2 - 12x + 1 = 0$ (b) $x^2 + 9 = 10x$

(3 × 3) 8. Solve the following equations with the quadratic formula:

(a) $4x^2 + 25 = 20x$ (b) $x^2 - 10x = 30$ (c) $x^2 + 2x - 6 = 0$

(3 × 3) 9. Solve the following equations (any valid method):

(a) $(2x + 1)^2 = (x + 3)^2$ (b) $x(2x + 19) = 4(x + 2)$ (c) $\frac{x}{3} = \frac{6 - x}{x}$

(Total: 50)