

## MAS051 — Example Sheet 6

To be handed in: Friday, November 1, 2002

Remember to give your Tutorial Group, along with your name, on the assignment. Only the *asterisked* (starred) questions will be marked.

**1** Complete the square of the quadratic expressions in the following equations, and hence solve the equations:

(a)  $x^2 + 6x - 12 = 0$ ;      (b)\*  $x^2 - 12x - 36 = 0$ ;      (c)\*  $4x^2 + 8x - 12 = 0$ .

**2** Write down the solutions of the following factorised equations:

(a)  $(x - 2)(x + 3) = 0$ ;      (c)\*  $x^2(3x + \sqrt{7}) = 0$ ;  
(b)  $(x - 2)(x + 5)(x - \frac{2}{3}) = 0$ ;      (d)\*  $(\frac{1}{2}x + 2)(\sqrt{3}x - \sqrt{6})(x - 1 + \sqrt{3}) = 0$ .

**3** Factorise the following cubic expressions,  $f(x)$ , making use of the root of the corresponding equation,  $f(x) = 0$ , where given. Hence give the solutions of  $f(x) = 0$ .

(a)  $f(x) = x^3 - 7x^2 + 7x + 15$ ,  $f(-1) = 0$ ;      (d)\*  $f(x) = x^3 - x^2 - 4x + 4$ ;  
(b)  $f(x) = 6x^3 + 5x^2 - 22x - 24$ ,  $f(2) = 0$ ;      (e)  $f(x) = 6x^3 - 18x^2 - 24x$ ;  
(c)\*  $f(x) = 4x^3 - 32x^2 + 25x + 21$ ,  $f(7) = 0$ ;      (f)\*  $f(x) = x^3 - 4x^2 - 5x + 14$ .

**4** Solve the following equations for  $x$ :

(a)\*  $x + 2 = 2x + 3$ ;      (d)  $\frac{1}{x + 1} = \frac{2}{1 - x}$ ;  
(b)  $(x + 1)(x + 2) = (x - 1)(x - 2)$ ;  
(c)\*  $\frac{1}{x + 1} + \frac{1}{x + 2} = \frac{1}{x + 3}$ ;      (e)  $\frac{x^2 + 1}{x^2 - 1} = 2$ .

**5** Express the following quadratic equations in standard form, and use the formula to calculate their solutions, where real solutions exist:

(a)  $2x(x + 2) = -2$ ;      (c)  $x + 6 = \frac{3}{x}$ ;      (e)\*  $\frac{1}{x + 1} - \frac{3}{x - 2} = \frac{2}{x - 1}$ .  
(b)\*  $-2x(1 - 2x) = -3$ ;      (d)  $\frac{1}{x + 2} + \frac{2}{x - 1} = 3$ ;

**6** Factorise the following quadratic expressions,  $f(x)$ . Hence give the solutions of  $f(x) = 0$ .

(a)\*  $f(x) = x^2 - 3x - 4$ ;      (d)\*  $f(x) = 6x^2 + 16x + 8$   
(b)  $f(x) = 3x^2 - 17x - 6$       (e)  $f(x) = 2x^2 + 9x + 8$ ;  
(c)  $f(x) = 4x^2 + 12x + 8$       (f)\*  $f(x) = 3x^2 - x - 2$ .