

## Sixteenth Set of Homework for Math 05

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**Please note:** You should fully justify your answers.

### 1 Solving higher degree equations

1. Solve the following equations:

(a)  $5(3x - 7) = 0$       $x = \frac{7}{3}$

(b)  $3x(x - 1) = 0$       $x = 0$  or  $x = 1$

(c)  $(x - 1)(x + 3)(2x + 5) = 0$       $x = -3$  or  $x = 1$  or  $x = -\frac{5}{2}$

(d)  $2x(3x - 1)(x^2 + 1) = 0$       $x = 0$  or  $x = \frac{1}{3}$

(e)  $(x + 7)^2(x - 2)(x + 1) = 0$       $x = -7$  or  $x = 2$  or  $x = -1$

2. Solve the following equations:

(a)  $x^2 - 7x = 0$       $x = 0$ ,  $x = 7$

(b)  $x^2 - 64 = 0$       $x = -8$ ,  $x = 8$

(c)  $3x^3 - 75x = 0$       $x = 0$ ,  $x = -5$ ,  $x = 5$

(d)  $x^2 - x - 6 = 0$       $x = -2$ ,  $x = 3$

(e)  $x^2 - 12x + 35 = 0$       $x = 5$ ,  $x = 7$

(f)  $x^2 + 16x + 55 = 0$       $x = -5$ ,  $x = -11$

(g)  $6x^2 - 5x + 1 = 0$       $x = \frac{1}{3}$ ,  $x = \frac{1}{2}$

(h)  $x^2 - 2x - 80 = 0$       $x = -8$ ,  $x = 10$

(i)  $10x^3 - 29x^2 + 10x = 0$       $x = \frac{2}{5}$ ,  $x = \frac{5}{2}$

(j)  $3x^2 + 12 = 0$      No solution

(k)  $2x^2 + x - 15 = 0$       $x = -3$ ,  $x = -\frac{5}{2}$

(l)  $18x^2 + 29x + 3 = 0$       $x = -\frac{3}{2}$ ,  $x = -\frac{1}{9}$

(m)  $3x^3 + 3x^2 - 6x = 0$       $x = 0$ ,  $x = 1$ ,  $x = -2$

(n)  $x^4 - 81 = 0$       $x = 3$ ,  $x = -3$

(o)  $x^4 - 5x^2 + 4 = 0$       $x = -1$ ,  $x = 1$ ,  $x = -2$ ,  $x = 2$

(p)  $x^4 + 10x^2 + 9 = 0$      No solution

(q)  $x^3 - 27 = 0$       $x = 3$

(r)  $x^5 - 2x^3 + x^4 - 8x^2 - 8x + 16 = 0$       $x = 2$ ,  $x = 1$ ,  $x = -2$

3. Solve the following equations:

(a)  $x^2 + 4x + 2 = 7$       $x = 1$ ,  $x = -5$

(b)  $x^3 = 4x$       $x = -2$ ,  $x = 0$ ,  $x = 2$

(c)  $x^2 + 8x + 6 = 3x$       $x = -2$ ,  $x = -3$

(d)  $2x(x + 11) = 13x + 5$       $x = -5, \quad x = \frac{1}{2}$

4. Find a polynomial equation that satisfies the given conditions. Both sides of the equation should be in Simplified Expanded Form.

(a) has solutions  $x = 1, x = 0$  and  $x = -5$ .      $x^3 + 4x^2 - 5x = 0$

(b) its only real solutions are  $x = 3, x = \frac{3}{2}$  and has degree 3.      $x^3 - \frac{15}{2}x^2 + 18x - \frac{27}{2}$

(c) it has solutions  $x = \frac{1}{2}, x = 2, x = -\frac{2}{3}$  and integer coefficients.      $6x^3 - 19x^2 + 16x - 4 = 0$