MA1200 Answer

Chapter 3 Polynomials and Rational Functions

1. (a) $g(2x) = -12x^2 + 48x - 36$

   $g(-x) = -3x^2 - 24x - 36$

   (b) neither

   (c) $g(x) + g(-x) = -6x^2 - 72$. Even.

   (d) $g(x) - g(-x) = 48x$. Odd.

2. (a) (i) $3(x-(-2))^2 - 48$ (ii) $(-2, -48)$ (iii) Domain: **R**, range: $[-48, \infty)$

   (b) (i) $-2(x-3)^2 + 32$ (ii) $(3, 32)$ (iii) Domain: **R**, range: $(-\infty, 32]$

   (c) (i) $-(x-5)^2$ (ii) $(5, 0)$ (iii) Domain: **R**, range: $(-\infty, 0]$

   (d) (i) $3\left(x-\left(-\frac{3}{2}\right)\right)^2 + \frac{93}{4}$ (ii) $\left(-\frac{3}{2}, \frac{93}{4}\right)$ (iii) Domain: **R**, range: $\left[\frac{93}{4}, \infty\right)$

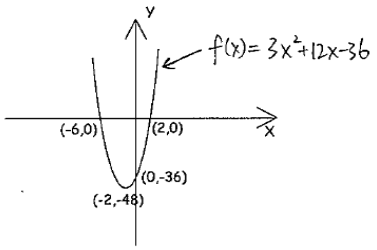

Figure 1: 2(a)(iv) $3x^2 + 12x - 36 = f(x)$

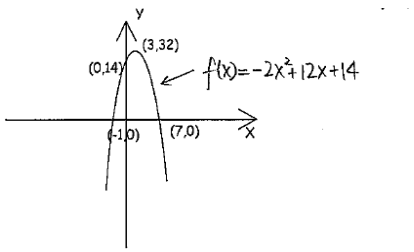

Figure 2: 2(b)(iv) $-2x^2 + 12x + 14 = f(x)$

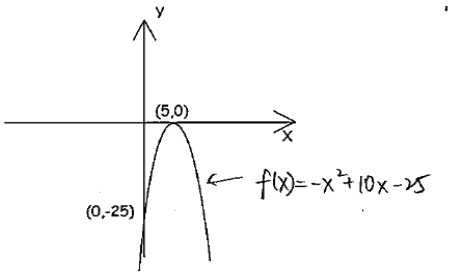

Figure 3: 2(c)(iv) $-x^2 + 10x - 25 = f(x)$

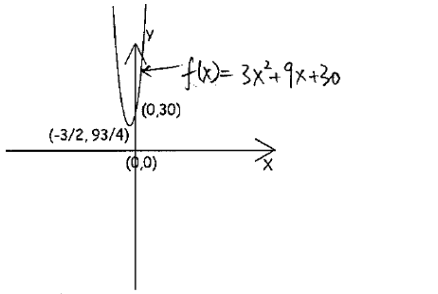

Figure 4: 2(d)(iv) $3x^2 + 9x + 30 = f(x)$

3. (a) Quotient: $x^2 + 5x - 1$, Remainder: –3

   (b) Quotient: $-x^2 + 4x - 2$, Remainder: 27

   (c) Quotient: $-3x^2 - \frac{12}{7}x + \frac{247}{49}$, Remainder: $-\frac{341}{49}$

   (d) Quotient: $3x^2 + x + 5$, Remainder: 6

4. (a) 26 (b) 65 (c) –8 (d) $-\frac{23}{3}$

5. (a) $(x-1)(x+2)(x+5)$
   (b) $(x-2)(3x-1)(x+5)$
   (c) $(x-2)(x-1)(2x+1)$
   (d) $(x-1)(x+2)^2$

6. (a) $\mathbf{R} \setminus \{\frac{1}{2}, -2, -3\}$
   (b) $\mathbf{R} \setminus \{-1, 5\}$
   (c) $\mathbf{R} \setminus \{2, -\frac{1}{2}\}$
   (d) $\mathbf{R} \setminus \{-1, -3, -5\}$
   (e) $\mathbf{R} \setminus \{1\}$
   (f) $\mathbf{R} \setminus \{-3\}$

7. (a) $\dfrac{1}{x+1} + \dfrac{3}{x+2} + \dfrac{-1}{x+4}$
   (b) $\dfrac{3}{4(x-1)} + \dfrac{1}{2(x+1)} - \dfrac{1}{4(x+3)}$
   (c) $\dfrac{-6}{x+5} + \dfrac{2x-1}{x^2+3}$
   (d) $\dfrac{1}{x+3} - \dfrac{2}{(x+3)^2} + \dfrac{5}{(x+3)^3}$
   (f) $\dfrac{3}{x-2} + \dfrac{1}{x+2} + \dfrac{4}{(x+2)^2}$
   (g) $\dfrac{1}{x+2} + \dfrac{5}{(x+2)^2} + \dfrac{2}{x^2+1}$