Ch. 2 Sec 2.1

#1a) $2x^3 + 5x^2 + 7x + 3 \div x + 1$

$$2x^2 + 3x + 4 + \frac{-1}{x+1}$$

$$x+1 \;\overline{)\; 2x^3 + 5x^2 + 7x + 3}$$

$$-(2x^3 + 2x^2)$$

$$3x^2 + 7x$$

$$-(3x^2 + 3x)$$

$$4x + 3$$

$$-(4x + 4)$$

$$-1$$

← Answer *

* Note: What this means is seen in the alternate form of the answer:

From $\frac{\text{Dividend}}{\text{Divisor}} = \text{Quotient} + \frac{\text{Remainder}}{\text{Divisor}}$

We get Dividend = Quotient · Divisor + Remainder

Hence: $2x^3 + 5x^2 + 7x + 3 = (2x^2 + 3x + 4)(x+1) + (-1)$

You'll give your answer as seen at top.

$x^3 - 1$ ← Answer

#1b) $x+2 \;\overline{)\; x^4 + 2x^3 - x - 2}$

$-(x^4 + 2x^3)$

$-x - 2$

$-(-x - 2)$

0

#1c) $2x-3 \;\overline{)\; 4x^3 + 0x^2 - 3x + 5}$ $\quad 2x^2 + 3x + 3 + \frac{14}{2x-3}$ ← Answer

$-(2x^3 - 6x^2)$

$6x^2 - 3x$

$-(6x^2 - 9x)$

$6x + 5$

$-(6x - 9)$

14

#1d) $x^2 - 2 \;\overline{)\; x^6 + 3x^5 - x^4 + 0x^3 + x^2 + 0x + 2}$ $\quad x^4 + 3x^3 + x^2 + 6x + 3 + \frac{12x+8}{x^2-2}$ ← Answer (entire quotient)

$-(x^6 - 2x^4)$

$3x^5 + x^4 + 0x^3$

$-(3x^5 - 6x^3)$

$x^4 + 6x^3 + x^2$

$-(x^4 - 2x^2)$

$6x^3 + 3x^2 + 0x$

$-(6x^3 - 12x)$

$3x^2 + 12x + 2$

$-(3x^2 - 6)$

$12x + 8$

Ch. 2 Sec 2.2

#3 e) $-x^2 + 30x - 100$ make leading coeff +1 & group only first 2 terms.

$= -(x^2 - 30x) - 100$

$= -(x^2 - 30x + 15^2) - 100 + 15^2$

(-15^2 subtracted; $+15^2$ add it back)

$= -(x - 15)^2 + 125$ ← Answer

#3d) $-x^2 - x + 1 = -(x^2 + x) + 1$

$= -\left(x^2 + x + \left(\frac{1}{2}\right)^2\right) + 1 + \left(\frac{1}{2}\right)^2$

$= -\left(x + \frac{1}{2}\right)^2 + \frac{5}{4}$ ← Answer

#3e) $4x^2 + 24x + 3 = 4(x^2 + 6x) + 3$

$= 4(x^2 + 6x + 9) + 3 - 36$

(added 36; subtract it)

$= 4(x + 3)^2 - 33$ ← Answer

#3f) $-5x^2 - 10x + 1 = -5(x^2 + 2x) + 1$

$= -5(x^2 + 2x + 1) + 1 + 5$

$= -5(x + 1)^2 + 6$ ← Answer

#3g) $-3x^2 + 12x - 5 = -3(x^2 - 4x) - 5$

$= -3(x^2 - 4x + (-2)^2) - 5 + 12$

$(-2)^2$: subtracted 12; $+12$: add it back

$= -3(x-2)^2 + 7$ ← Answer

#3h) $\frac{1}{2}x^2 + x + 2 = \frac{1}{2}(x^2 + 2x) + 2$

$= \frac{1}{2}(x^2 + 2x + 1) + 2 - \frac{1}{2}$

$= \frac{1}{2}(x+1)^2 + \frac{3}{2}$ ← Answer

#3i) $9x^2 + 12x + 4 = 9(x^2 + \frac{12}{9}x) + 4$

reduce first

$= 9(x^2 + \frac{4}{3}x + (\frac{4/3}{2})^2) + 4 + ?$

$\frac{4/3}{2} = \frac{4}{3} \div 2 = \frac{4}{3} \cdot \frac{1}{2} = \frac{4}{6} = \frac{2}{3}$; $(\frac{2}{3})^2 = \frac{4}{9}$

So far: $9(x^2 + \frac{4}{3}x + \frac{4}{9}) + 4 + ?$

Since we added $9 \cdot \frac{4}{9} = 4$, we must subtract 4 too.

Thus, $9(x^2 + \frac{2}{3})^2$ is the answer.

#5) $ax^2 + bx + c$ Complete the square as before

$$a\left(x^2 + \frac{b}{a}x + \left(\frac{b/a}{2}\right)^2\right) + c - a\left(\frac{b/a}{2}\right)^2$$

$$= a\left(x + \frac{b/a}{2}\right)^2 + c - \frac{a\cdot(b/a)^2}{4}$$

$$= a\left(x + \frac{b}{2a}\right)^2 + \frac{-ab^2/a^2}{4} + c$$

$$= a\left(x + \frac{b}{2a}\right)^2 + \frac{-b^2}{4a} + c \quad //$$