Ch. 2 Rev. Ex.

1-12, 13-16 end behavior, 25-26, 29-32, 37-38, 61-66

1) (-3, -2) (4, -9)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9+2}{4+3} = \frac{-7}{7} = -1$

$y + 2 = -1(x+3)$

$y + 2 = -1x - 3$

$y = -1x - 5$ $\boxed{f(x) = -x - 5}$

2) (-3, 6) (1, -2)

$m = \frac{-2-8}{1+3} = \frac{-8}{4} = -2$

$y + 2 = \frac{-8}{3}(x-1)$

$y + 2 = \frac{-8}{3}x + \frac{8}{3}$

$y = \frac{-8}{3}x + \frac{8}{3} - \frac{6}{3}$

$y = -\frac{8}{3}x + \frac{2}{3}$

oops I'm not perfect

$y + 2 = -2(x-1)$

$y + 2 = -2x + 2$

$y = -2x$

$\boxed{f(x) = -2x}$

3) v. stretch factor of 3, right 2, up 4

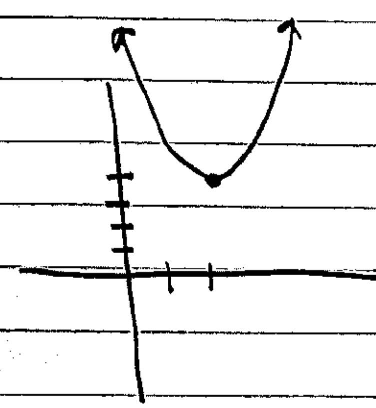
vertex (2, 4) axis x = 2 opens up vertex is min.

y-int $h(0) = 3(0-2)^2 + 4$

$3 \cdot 4 + 4$

$12 + 4$

→ (0, 16)



x-int $0 = 3(x-2)^2 + 4$

$\sqrt{\frac{-4}{3}} = \sqrt{(x-2)^2}$

no x-int

4) reflection over x-axis, left 3, up 1

vertex $(-3,1)$ axis $x=-3$

y-int $g(0) = -(0+3)^2+1$

$= -9+1$

$= -8$

→ $(0,-8)$

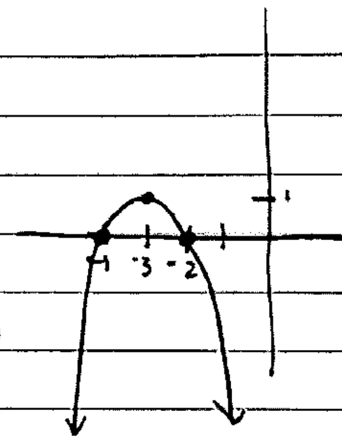
x-int $0 = -(x+3)^2+1$

$\pm\sqrt{1} = \sqrt{(x+3)^2}$

$\pm 1 = x+3$

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

$-3-1 = (-4, 0)$



5) vertex $(-3,5)$

axis $x=-3$

6) vertex $(5,-7)$

axis $x=5$

7) vertex $(-4,1)$ Axis $x=-4$

method 1

$x = \frac{16}{2(-2)} = \frac{16}{-4} = -4$

$f(-4) = -2(-4)^2 - 16(-4) - 31$

$-2(16)$

$= -32 + 64 - 31$

$= 32 - 31$

$f(-4) = 1$

method 2 complete the square

$y = -2(x^2+8x+16) - 31 + 32$

$y = -2(x+4)^2 + 1$

8) vertex $(1,-1)$ axis $x=1$

$x = \frac{6}{2(3)} = \frac{6}{6} = 1$

$f(1) = 3(1)^2 - 6(1) + 2$

$3 - 6 + 2 = -1$

$y = 3(x^2 - 2x \quad) + 2$

$y = 3(x - 2x + 1) + 2 - 3$

$y = 3(x-1)^2 - 1$

9) $y = a(x-h)^2 + k$ vertex $(-2,-3)$

$y = a(x+2)^2 - 3$ ←

$2 = a(1+2)^2 - 3$ point $(1,2)$

$2 = a \cdot 3^2 - 3$

$2 = 9a - 3$

$5 = 9a$

$\frac{5}{9} = a$

$\boxed{y = \frac{5}{9}(x+2)^2 - 3}$

10) $y = a(x-h)^2 + k$ $v(-1,1)$

$y = a(x+1)^2 + 1$ pt $(3,-2)$

$-2 = a(3+1)^2 + 1$

$-2 = a \cdot 4^2 + 1$

$-2 = 16a + 1$

$-3 = 16a$

$-\frac{3}{16} = a$

$\boxed{y = -\frac{3}{16}(x+1)^2 + 1}$

11) vertex $(3,-2)$ pt $(5,0)$

same wk as #9,10

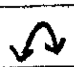
$y = \frac{1}{2}(x-3)^2 - 2$

12) vertex $(-4,5)$ pt $(0,-3)$

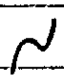
same wk as #9,10

$y = -\frac{1}{2}(x+4)^2 + 5$

 13) $\lim_{x \to -\infty} f(x) = \infty$ $\lim_{x \to \infty} f(x) = \infty$

 14) $\lim_{x \to -\infty} f(x) = -\infty$ $\lim_{x \to \infty} f(x) = -\infty$

 15) $\lim_{x \to -\infty} f(x) = -\infty$ $\lim_{x \to \infty} f(x) = \infty$

 16) $\lim_{x \to -\infty} f(x) = -\infty$ $\lim_{x \to \infty} f(x) = \infty$

25) $3\,|\;\; 2 \quad -7 \quad 4 \quad -5$

$\quad\; \downarrow \quad 6 \quad -3 \quad 3$

$\quad\; 2 \quad -1 \quad 1 \quad -2$

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

26) $-2\,|\;\; 1 \quad 3 \quad 1 \quad -3 \quad 3$

$\quad\; \downarrow \quad -2 \quad -2 \quad 2 \quad 2$

$\quad\; 1 \quad 1 \quad -1 \quad -1 \quad 5$

$x^3 + x^2 - x - 1 + \frac{5}{x+2}$

29) $f(-2) = 3(-2)^3 - 2(-2)^2 + (-2) - 5$

$3(-8) - 2\cdot 4 - 2 - 5$

$-24 - 8 - 2 - 5$

$\boxed{-39}$

30) $f(3) = -(3)^2 + 4(3) - 5$

$-9 + 12 - 5$

$\boxed{-2}$

31) $2\,|\;\; 1 \quad -4 \quad 8 \quad -8$

$\quad\; \downarrow \quad 2 \quad -4 \quad 8$

$\quad\; 1 \quad -2 \quad 4 \quad 0$ ✓

Yes $x-2$ is a factor of $x^3 - 4x^2 + 8x - 8$

32) $-3\,|\;\; 1 \quad 2 \quad -4 \quad -2$

$\quad\; \downarrow \quad -3 \quad 3 \quad 3$

$\quad\; 1 \quad -1 \quad -1 \quad 1$

No $x+3$ is not a factor of $x^3 + 2x^2 - 4x - 2$

37) poss RR $\dfrac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2}$

$-3/2$	2	−1	−4	−1	−6
	↓	−3	6	−3	6
2	2	−4	2	−4	0 ✓
	↓	4	0	4	
	2	0	2	0 ✓	

$2x^2 + 2 = 0$

$x = \pm i$ $\qquad x = -\frac{3}{2} \quad x = 2$

↑ complex solns. $\qquad$ Rational Rts

38) poss RR $\dfrac{\pm 1, \pm 7}{\pm 1, \pm 2, \pm 3, \pm 6}$

$7/3$	6	−20	11	7
	↓	14	−14	−7
	6	−6	−3	0

$6x^2 - 6x - 3$

$x = \dfrac{6 \pm \sqrt{108}}{12}$ $< {}^{36}_{3}$

$= \dfrac{6 \pm 6\sqrt{3}}{12} = \dfrac{1 + \sqrt{3}}{2}$

61) $f(x) = (x-3)(x-\sqrt{5})(x+\sqrt{5})$

$= (x-3)(x^2-5)$

$f(x) = x^3 - 3x^2 - 5x + 15$

62) $f(x) = (x+3)(x+3)$

$\boxed{f(x) = x^2 + 6x + 9}$

63) $f(x) = (x-3)(x+2)(3x$ [redacted] $1)(2x+1)$

$\text{or} = (x-3)(x+2)(x-\frac{1}{3})(x+\frac{1}{2})$

$\boxed{f(x) = 6x^4 - 5x^3 - 38x^2 - 5x + 6}$ ~~foil~~ answer.

64) $f(x) = (x-2)(x-(1+i))(x-(1-i))$

$\boxed{f(x) = x^3 - 4x^2 + 6x - 4}$

65) $f(x) = (x+2)^2 \ (x-4)^2$

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

$\boxed{f(x) = x^4 - 4x^3 - 12x^2 + 32x + 64}$

66) $f(x) = a(x+1)(x-(2-i))(x-(2+i))$

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

$(x^2 - 2x - \cancel{xi} - 2x + \cancel{xi} + 4 - i^2)$ $\quad +1$

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

$x^3 - 4x^2 + 5x$

$x^2 - 4x + 5$

$f(x) = a(x^3 - 3x^2 + x + 5)$

$6 = a(2^3 - 3 \cdot 2^2 + 2 + 5)$

$6 = a(8 - 12 + 2 + 5)$

$6 = 3a$

$2 = a$

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

$\boxed{f(x) = 2x^3 - 6x^2 + 2x + 10}$