Review Chapter 2

① $f(x) = x^3 + 6x^2 + 11x + 6$

	1	6	11	6
	↓	-1	-5	-6
-1	1	5	6	0

$x^2 + 5x + 6 = 0$

$(x+2)(x+3)$

Zeros: $-1, -2, -3$

② $f(x) = x^3 - x^2 - 5x + 5$

	1	-1	-5	+5
	↓	1	0	-5
1	1	0	-5	0

$x^2 - 5 = 0$

$x^2 = 5$

Zeros: $1, \pm\sqrt{5}$

③ $f(x) = x^4 - 5x^2 - 6$

$(x^2 - 6)(x^2 + 1)$

$x^2 = 6$ $\quad x^2 = -1$

$x = \pm\sqrt{6}$ $\quad x = \pm i$

Zeros: $\pm\sqrt{6}, \pm i$

④ $f(x) = x^4 + x^3 - x^2 + x - 2$

	1	1	-1	1	-2
	↓	1	2	1	2
1	1	2	1	2	0
	↓	-2	0	-2	
-2	1	0	1	0	

$x^2 + 1 = 0$

$x^2 = -1$

$x = \pm i$

Zeros: $1, -2, \pm i$

⑤ $f(x) = x^3 + 2x^2 - 5x - 6$

	1	2	-5	-6
	↓	-1	-1	6
-1	1	1	-6	0

$x^2 + x - 6 = 0$

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

Zeros: $-1, -3, 2$

⑥ $f(x) = x^4 - 3x^3 - 13x^2 + 51x - 36$ factors: $(x-1)(x+4)$

	1	−3	−13	51	−36
	↓	1	−2	−15	36
1	1	−2	−15	36	0
	↓	−4	24	−36	
−4	1	−6	9	0	

$x^2 - 6x + 9$

$(x-3)(x-3)$

$\boxed{(x-1)(x+4)(x-3)^2}$

⑦ $f(x) = x^4 - 4x^3 - 16x^2 + 16x + 48$ factors: $(x+2)(x-2)$

	1	−4	−16	16	48
	↓	−2	12	8	−48
−2	1	−6	−4	24	0
	↓	2	−8	−24	
2	1	−4	−12	0	

$x^2 - 4x - 12$

$(x-6)(x+2)$

$\boxed{(x+2)^2(x-2)(x-6)}$

⑧ a) $-5i$ b) $(x+5i)(x-5i) = x^2 - 25i^2 = x^2 + 25$

$$x^2+25 \;\overline{)\; 2x^3 + 3x^2 + 50x + 75}$$

$2x + 3$

$-(2x^3 \quad + 50x)$

$3x^2 + 75$

$-(3x^2 + 75)$

0

$x^2 + 25 = 0$

$x^2 = -25$

$x = \pm 5i$

$\boxed{(2x+3)(x+5i)(x-5i)}$

Chapter 2 Review

(9) $f(x) = 4x^3 + 0x^2 - 13x + 10$

$$\begin{array}{r|cccc} -2 & 4 & 0 & -13 & 10 \\ & \downarrow & -8 & 16 & -6 \\ \hline & 4 & -8 & 3 & 4 \end{array}$$

$\boxed{4}$

(10) $6x^3 + 7x^2 - x + 26 \div (x-3)$

$$\begin{array}{r|cccc} 3 & 6 & 7 & -1 & 26 \\ & \downarrow & 18 & 75 & 222 \\ \hline & 6 & 25 & 74 & 248 \end{array}$$

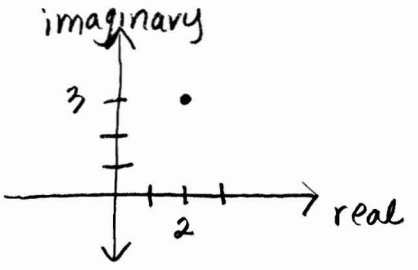
$\boxed{6x^2 + 25x + 74 + \frac{248}{x-3}}$

(11)

$$\begin{array}{r} x^2 - 3x + 1 \\ 4x+5 \;\overline{)\; 4x^3 - 7x^2 - 11x + 5} \\ -(4x^3 + 5x^2) \\ \hline -12x^2 - 11x \\ -(-12x^2 - 15x) \\ \hline 4x + 5 \end{array}$$

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

(12)



(13) $3 - (-2+3i) + (-5+i)$

$3 + 2 - 3i - 5 + i = \boxed{-2i}$

(14) $(2-i)(4+3i) = 8 + 6i - 4i - 3i^2 = 8 + 2i + 3 = \boxed{11 + 2i}$

(15) $(\sqrt{-4})(\sqrt{-16}) = (2i)(4i) = 8i^2 = \boxed{-8}$

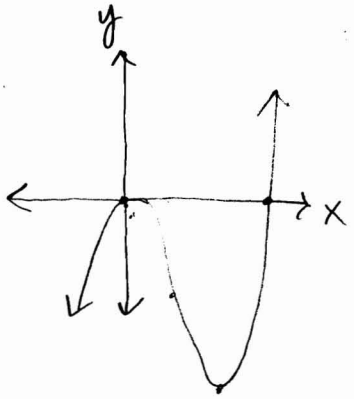
(16) $\frac{(2+3i)}{(4-2i)} \cdot \frac{(4+2i)}{(4+2i)} = \frac{8 + 4i + 12i + 6i^2}{16 - 4i^2} = \frac{8 + 16i - 6}{16 + 4} = \frac{2 + 16i}{20}$

$= \boxed{\frac{1 + 8i}{10}}$

(17) $\frac{6}{i} \cdot \frac{i}{i} = \frac{6i}{i^2} = \boxed{-6i}$

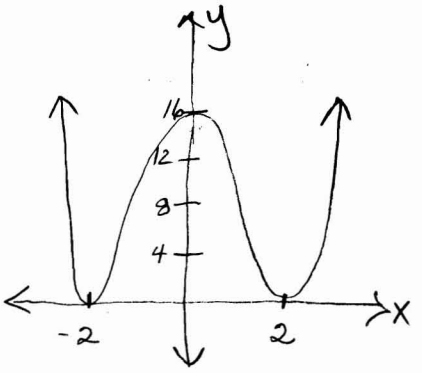
(18) $f(x) = x^2(x-3)$

a) 3rd degree
b) down & up
c) x int: (0,0) (3,0)
y int: (0,0)



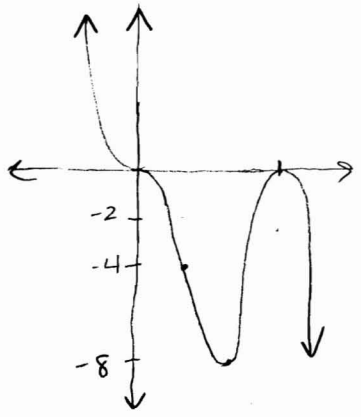
(19) $f(x) = (x-2)^2(x+2)^2$

a) 4th degree
b) up & up
c) x int: (2,0) (-2,0)
y int: (0,16)



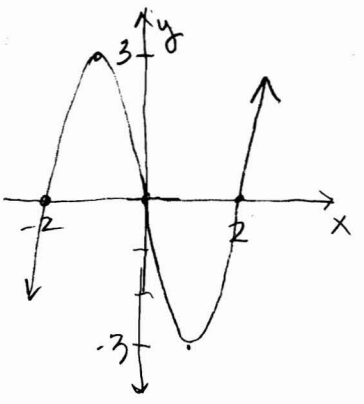
(20) $f(x) = -x^3(x-3)^2$

a) 5th degree
b) up & down
c) x int: (0,0) (3,0)
y int: 0,0



(21) $f(x) = x^3 - 4x = x(x^2-4)$
$= x(x+2)(x-2)$

a) 3rd degree
b) down & up
c) Xint: (0,0) (-2,0) (2,0)
yint: (0,0)



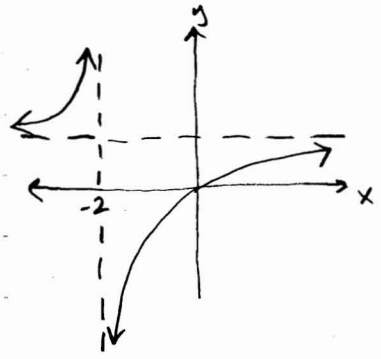
Chapter 2 Review

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

(23) $y = (x-3)^3(x+1)$

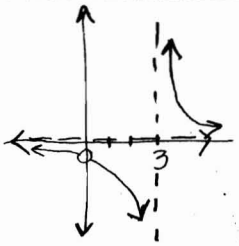
(24) $\frac{x}{x+2}$

a. V.A. $x=-2$
H.A $y=1$
b. $\{x \mid x \neq -2\}$
c. graph



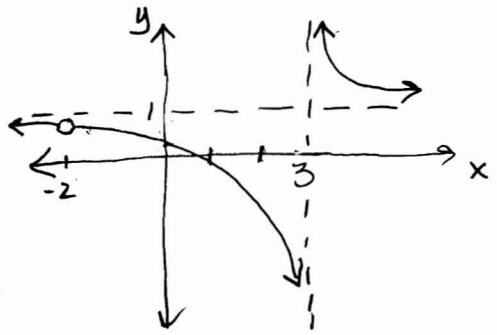
(25) $\frac{2x}{x^2-3x} = \frac{2x}{x(x-3)} = \frac{2}{x-3}$

a. V.A $x=3$
H.A $y=0$
b. $\{x \mid x \neq 3 \text{ or } 0\}$



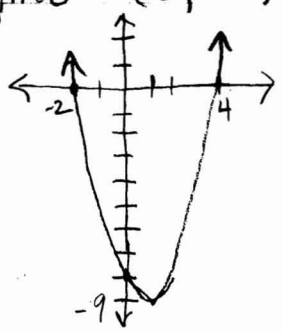
(26) $\frac{x^2-4}{x^2-x-6} = \frac{(x+2)(x-2)}{(x-3)(x+2)} = \frac{x-2}{x-3}$

a. V.A $x=3$
H.A $y=1$
b. $\{x \mid x \neq 3 \text{ or } -2\}$



(27) $f(x) = x^2-2x-8$
$= (x^2-2x+1)-8-1$
$= (x-1)^2-9$

a) V $(1,-9)$
b) $(x-4)(x+2)=0$
$x=4,-2$
xint: $(4,0)$ $(-2,0)$
yint: $(0,-8)$



(28) $f(x) = -2x^2-4x+1$
$= -2(x^2+2x+\underline{1})+1+\underline{2}$
$= -2(x+1)^2+3$

a) V $= (-1,3)$

b) $0 = -2(x+1)^2+3$
$-3 = -2(x+1)^2$
$\frac{3}{2} = (x+1)^2$
$-1 \pm \sqrt{1.5} = x$
xint $(-1+\sqrt{1.5},0)$ $(-1-\sqrt{1.5},0)$
$(.22,0)$ $(-2.22,0)$
yint: $(0,1)$