p. 1045
#3, 11, 15, 41, 49, 50, 59
11.5A

3.) $(-3+2i)-(4-4i)$

$-3+2i-4+4i$

$\boxed{-7+6i}$

11.) $(3-4i)(2+i)$

$6+3i-8i-4i^2$

$6-5i-4(-1)$

$6-5i+4$

$\boxed{10-5i}$

15.) $\frac{10}{3-4i}\cdot\frac{3+4i}{3+4i}$

$\frac{30+40i}{9+12i-12i-4i^2}$

$\frac{30+40i}{9-16(-1)}$

$\frac{30+40i}{25}$

$\frac{30}{25}+\frac{40}{25}i$

$\boxed{\frac{6}{5}+\frac{8}{5}i}$

41.) $\sqrt{-25}=\boxed{5i}$

49.) $x^2-6x+13=0$

CANNOT BE FACTORED

$\frac{+6\pm\sqrt{(-6)^2-4(13)}}{2}$

$\frac{+6\pm\sqrt{36-52}}{2}$

$\frac{6\pm\sqrt{-16}}{2}=$

$\frac{6\pm4i}{2}$

$\boxed{3+2i,\ 3-2i}$

50.) $x^2+4x+8=0$

$\frac{-4\pm\sqrt{4^2-4(8)}}{2}$

$\frac{-4\pm\sqrt{16-32}}{2}$

$\frac{-4\pm\sqrt{-16}}{2}$

$\frac{-4\pm4i}{2}$

$\boxed{-2+2i,\ -2-2i}$

59.) $x^3-8=0$

$x^3=8$

$x=2$

But there are 2 complex solutions — must be 3 total!

FACTOR: $(x-2)(x^2+2x+4)=0$

$x-2=0$

$\boxed{x=2}$

↑ Real

$x^2+2x+4=0$

$\frac{-2\pm\sqrt{4-4(4)}}{2}$

$\frac{-2\pm\sqrt{-12}}{2}$

$\frac{-2\pm\sqrt{4}\sqrt{-3}}{2}$

$\frac{-2\pm2\sqrt{3}\sqrt{-1}}{2}$

$\frac{-2\pm2\sqrt{3}i}{2}$

$\boxed{-1+\sqrt{3}i,\ -1-\sqrt{3}i}$

p.257 # 4-10, 64-68, 78 EVEN
p.264 # 8, 10-18, 27, 28, 31, 32

(11.5A)

x-c a factor?

4.) $4x^4-15x^2-4$ $c=2$

$f(2)=4(2)^4-15(2)^2-4$

$64-60-4=0$

$x-2$ is a factor.

2 | 4 0 -15 0 -4

8 16 2 4

4 8 1 2 | 0

$(x-2)(4x^3+8x^2+x+2)$

or

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

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

6.) $f(x)=2x^6-18x^4+x^2-9$ $c=-3$

$f(-3)=2(-3)^6-18(-3)^4+(-3)^2-9$

$1458-1458+9-9=0$

$x+3$ is a factor

-3 | 2 0 -18 0 1 0 -9

-6 18 0 0 -3 9

2 -6 0 0 1 -3 | 0

$(x+3)(2x^5-6x^4+x-3)$

or

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

$(x+3)(x-3)(2x^4+1)$

8.) $f(x)=x^6-16x^4+x^2-16$ $c=-4$

$f(-4)=(-4)^6-16(-4)^4+(-4)^2-16$

$=4096-4096+16-16=0$

$x+4$ is a factor

-4 | 1 0 -16 0 1 0 -16

-4 16 0 0 -4 16

1 -4 0 0 1 -4 | 0

$(x+4)(x^5-4x^4+x-4)$

or

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

$(x+4)(x-4)(x^4+1)$

10.) $f(x)=3x^4+x^3-3x+1$ $c=-\frac{1}{3}$

$f(-\frac{1}{3})=3(-\frac{1}{3})^4+(-\frac{1}{3})^3-3(-\frac{1}{3})+1$

$=\frac{1}{27}+-\frac{1}{27}+3+1=4$

$x+\frac{1}{3}$ is not a factor.

64.) $f(x)=x^4+8x^3-x^2+2$ $[-1,0]$ ZERO IN INTERVAL?

$f(-1)=(-1)^4+8(-1)^3-(-1)^2+2=1-8-1+2=-6$

$f(0)=0^4+8(0)^3-0^2+2=2$

$x=-.60$

SIGN CHANGE ZERO IN INTERVAL

66.) $f(x)=3x^3-10x+9$ $[-3,2]$

$f(-3)=3(-3)^3-10(-3)+9$

$=-81+30+9=-42$

$f(2)=3(2)^3-10(2)+9$

$=16-20+9=5$

SIGN CHANGE - ZERO IN INTERVAL $x=-2.17$

68.) $f(x)=x^5-3x^4-2x^3+6x^2+x+2$ $[1.7,1.8]$

$f(1.7)=(1.7)^5-3(1.7)^4-2(1.7)^3+6(1.7)^2+1.7+2=.35627$

$f(1.8)=(1.8)^5-3(1.8)^4-2(1.8)^3+6(1.8)^2+1.8+2=-1.02112$

SIGN CHANGE - ZERO ON INTERVAL $x=1.73$

FIND REMAINING ZEROS

8.) DEGREE 4 ZEROS: $2-i, -i$ $2+i, i$

10.) DEGREE 6 ZEROS: $i, 3-2i, -2+i$ $-i, 3+2i, -2-i$

78.) Find length of cube if volume is doubled by adding 6 to one edge, 12 to another and subtracting 4 from 3rd.

$V=x^3$

$2V=2x^3$

$2x^3=(x+6)(x+12)(x-4)$

$2x^3=(x^2+18x+72)(x-4)$

$2x^3=x^3+18x^2+72x-4x^2-72x-288$

$2x^3=x^3+14x^2-288$

$x^3-14x^2+288=0$

$x=-4$ $x=6$

FORM A POLYNOMIAL:

11.) DEGREE 4 ZEROS: $3+2i$, 4-mult 2

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

$(x^2-8x+16)(x-3-2i)(x-3+2i)$

$(x^2-8x+16)(x^2-3x+2ix-3x+9-6i-2ix+6i-4i^2)$

$(x^2-8x+16)(x^2-6x+9-4(-1))$

$(x^2-8x+16)(x^2-6x+13)$

$x^4-6x^3+13x^2-8x^3+48x^2-104x+16x^2-96x+208$

$x^4-14x^3+77x^2-200x+208$

12) DEGREE 4 ZEROS: i, $1+2i$

$(x-i)(x+i)(x-(1+2i))(x-(1-2i))$

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

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

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

$\boxed{x^4-2x^3+6x^2-2x+5}$

13.) DEGREE 5 ZEROS $2, -i, 1+i$

$(x-2)(x-i)(x+i)(x-(1+i))(x-(1-i))$

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

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

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

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

$\boxed{x^5-4x^4+7x^3-8x^2+6x-4}$

27.) $f(x)=x^3-8x^2+25x-26$

From graph $x=2$ is a zero, so divide by $(x-2)$

2	1	-8	25	-26
		2	-12	26
	1	-6	13	0

$x^2-6x+13$, so:

$(x-2)(x^2-6x+13)$ ← Cannot be factored but must have 2 more zeros.

$\frac{6\pm\sqrt{(-6)^2-4(13)}}{2}$

$\frac{6\pm\sqrt{36-52}}{2} = \frac{6\pm\sqrt{-16}}{2}$

$= \frac{6\pm 4i}{2} = 3\pm 2i$

ZEROS: $\boxed{3\pm 2i}$ (COMPLEX), $\boxed{2}$ (REAL)

28.) $f(x)=x^3+13x^2+57x+85$ Three zeros, Real at $x=-5$

-5	1	13	57	85
		-5	-40	-85
	1	8	17	0

$x^2+8x+17$ CANNOT BE FACTORED

$\frac{-8\pm\sqrt{8^2-4(17)}}{2} = \frac{-8\pm\sqrt{64-68}}{2}$

$\frac{-8\pm\sqrt{-4}}{2} = \frac{-8\pm 2i}{2} = -4\pm i$

REAL ZERO: $\boxed{x=-5}$

COMPLEX ZEROS: $\boxed{x=-4+i \quad x=-4-i}$

31.) $f(x)=x^4+2x^3+22x^2+50x-75$

4 ZEROS - 2 REAL $\boxed{x=-3 \quad x=1}$ REAL

2 COMPLEX

$(x+3)(x-1)$

x^2+25

$x^2+2x-3 \;\overline{)\; x^4+2x^3+22x^2+50x-75}$

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

$25x^2+50x-75$

$-(25x^2+50x-75)$

0

$x^2+25=0$

$x^2=-25$

$x=\pm\sqrt{-25}$

$\boxed{x=\pm 5i}$

COMPLEX

32.) $f(x)=x^4+3x^3-19x^2+27x-252$ 4 ZEROS

REAL $\boxed{x=-7 \quad x=4}$ $(x-4)(x+7)=x^2+3x-28$

x^2+9

$x^2+3x-28 \;\overline{)\; x^4+3x^3-19x^2+27x-252}$

$-(x^4+3x^3-28x^2)$

$9x^2+27x-252$

$-(9x^2+27x-252)$

$x^2+9=0$

$x^2=-9$

$x=\pm\sqrt{-9}$

$\boxed{x=\pm 3i}$

COMPLEX