Chapter Review
page 976: 40, 48

40. $3y^3-18y^2-48y$

$3y(y^2-6y-16)$

$3y(y-8)(y+2)$

48. x^6+2x^3+1 is quadratic in form so:

let $x^3=t$, so then we have

t^2+2t+1

$(t+1)(t+1)$ and substituting $x^3=t$ back in we obtain

$(x^3+1)(x^3+1)$ and using our sum of perfect cubes factoring pattern we obtain

$(x+1)(x^2-x+1)(x+1)(x^2-x+1)$ which collecting terms gives

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

page 983: 10, 32, 38

10. This problem cannot be solved using synthetic division; long division must be used.

The quotient is $5x^2-11$ and the remainder is $x+20$.

32. This problem can be solved using long division or synthetic division.

The quotient is $x^4-x^3+x^2-x+1$ and the remainder is 0.

38. This problem can be solved using long division or synthetic division.

The quotient is $2x^5-6x^4+x-3$ and the remainder is 0. We can conclude that $x+3$ is a factor of $2x^6-18x^4+x^2-9$ since the remainder is 0.

page 998: 35, 62, 77, 108

35. $z(z^2+1)=3+z^3$

$z^3+z=3+z^3$

$z=3$

62. $|x^2+x|=12$

$x^2+x=12$

$x^2+x-12=0$

$(x+4)(x-3)=0$

$x=-4$ or $x=3$

$x^2+x=-12$

$x^2+x+12=0$

does not factor, complete the square so $\left(\frac{1}{2}\right)^2=\frac{1}{4}$

$x^2+x+.25=-11.75$

$\left(x+\frac{1}{2}\right)^2=\frac{-47}{4}$

$x+\frac{1}{2}=\frac{\pm i\sqrt{47}}{2}$

$x=-\frac{1}{2}\pm\frac{\sqrt{47}}{2}i$

77. $\frac{4(x-2)}{x-3}+\frac{3}{x}=\frac{-3}{x(x-3)}$

$\frac{x}{x}\cdot\frac{4(x-2)}{x-3}+\frac{3}{x}\cdot\frac{x-3}{x-3}=\frac{-3}{x(x-3)}$

$\frac{4x^2-8x}{x(x-3)}+\frac{3x-9}{x(x-3)}=\frac{-3}{x(x-3)}$

$\frac{4x^2-5x-9}{x(x-3)}=\frac{-3}{x(x-3)}$

$\frac{4x^2-5x-9}{x(x-3)}+\frac{3}{x(x-3)}=0$

$\frac{4x^2-5x-6}{x(x-3)}=0$, the only way a fraction can equal 0 is if the numerator is 0, so:

$4x^2-5x-6=0$

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

$x=-\frac{3}{4}$ or $x=2$

108. $x^2+\frac{2}{3}x-\frac{1}{3}=0$

$x^2+\frac{2}{3}x=\frac{1}{3}$, and $\left(\frac{2/3}{2}\right)^2=\frac{1}{9}$

$x^2+\frac{2}{3}x+\frac{1}{9}=\frac{1}{3}+\frac{1}{9}$

$\left(x+\frac{1}{3}\right)^2=\frac{4}{9}$

$x+\frac{1}{3}=\pm\frac{2}{3}$

$x=-1$ or $x=\frac{1}{3}$

page 1008: 24, 43, 72

24. $\frac{13}{5-12i}$

$\frac{13}{5-12i}\cdot\frac{5+12i}{5+12i}$

$\frac{65+132i}{25-60i+60i-144i^2}$

$\frac{65+132i}{25+144}$

$\frac{65+132i}{169}$

$\frac{65}{169}+\frac{132i}{169}$

$\frac{5}{13}+\frac{12}{13}i$

43. $i^7\left(1+i^2\right)$

$i^7(1+-1)$

0

72. $x^4+3x^2-4=0$ is quadratic in form, so:

let $x^2=t$, so then we have

$t^2+3t-4=0$

$(t+4)(t-1)=0$

$t=-4$ or $t=1$ and substituting $x^2=t$ back in we obtain

$x^2=-4$ or $x^2=1$

$x=-2i$, $x=2i$, $x=-1$, $x=1$

page 1029: 68, 81, 97

68. $\frac{x}{3}\geq 2+\frac{x}{6}$, subtract $\frac{x}{6}$ from each side

$\frac{x}{6}\geq 2$

$x\geq 12$

$[12,\infty)$

81. $\frac{1}{2}\leq\frac{x+1}{3}<\frac{3}{4}$, can be solved all at once or by writing two problems; I'll solve all at once, and I'll start by multiplying each portion by 3:

$\frac{3}{2}\leq x+1<\frac{9}{4}$

$\frac{1}{2}\leq x<\frac{5}{4}$

$[1/2,5/4)$

97. $|1-4x|-7<-2$

$|1-4x|<5$, this is an AND problem

$1-4x<5$ $\qquad$ $1-4x>-5$

$-4x<4$ $\qquad$ $-4x>-6$

$x>-1$ $\qquad$ $x<3/2$

$(-1,3/2)$

page 1037: 17, 41, 70

17. $\sqrt[4]{\frac{x^9 y^7}{x y^3}}$

$\sqrt[4]{x^8 y^4}$

$\sqrt[4]{x^4 x^4 y^4}$

$x^2|y|$, but since they told us in the problem that all variables are positive, then we can write $x^2 y$.

41. $\frac{2-\sqrt{5}}{2+3\sqrt{5}}$

$\frac{2-\sqrt{5}}{2+3\sqrt{5}} \cdot \frac{2-3\sqrt{5}}{2-3\sqrt{5}}$

$\frac{4-6\sqrt{5}-2\sqrt{5}+3\sqrt{25}}{4-6\sqrt{5}+6\sqrt{5}-9\sqrt{25}}$

$\frac{4-8\sqrt{5}+15}{4-45}$

$\frac{19-8\sqrt{5}}{-41}$

$\frac{-19+8\sqrt{5}}{41}$

70. $\left(4 x^{-1} y^{1/3}\right)^{3/2}$

$\left(\frac{4 y^{1/3}}{x}\right)^{3/2}$

$\frac{4^{3/2} y^{1/2}}{x^{3/2}}$

$\frac{8 y^{1/2}}{x^{3/2}}$