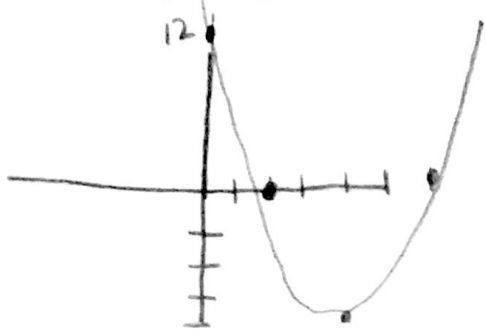


FINAL Review

Unit 1 (Ch 2)

1) $f(x) = (x-4)^2 - 4$



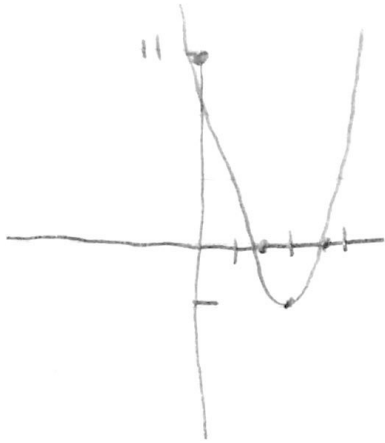
V: (4, -4)
int: (0, 12)
(6, 0)
(2, 0)

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

$$x-4 = \pm 2$$

$$x = 6 \text{ or } 2$$

2) $f(x) = 3x^2 - 12x + 11$



$$\frac{12}{2(3)} = 2$$

$$3(4) - 24 + 11 = -1$$

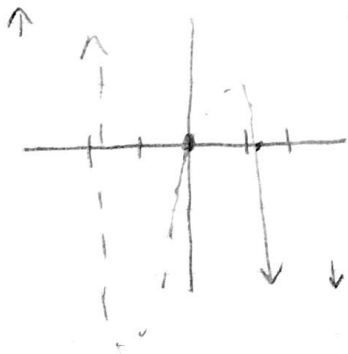
V: (2, -1)
int: (0, 11)
(2.6, 0)
(1.4, 0)

$$x = \frac{12 \pm \sqrt{144 - (4 \cdot 3 \cdot 11)}}{2(3)}$$

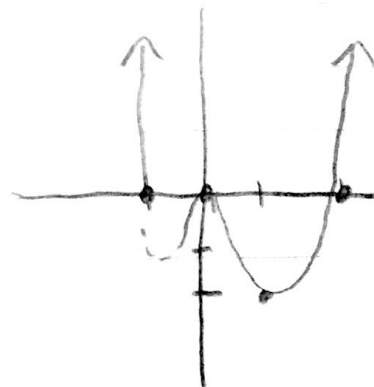
$$x = \frac{12 \pm \sqrt{12}}{6}$$

$$x = 2.6 \text{ or } 1.4$$

3) $f(x) = -x^5 - 7x^2 + 10x$
 $-x(x^4 + 7x + 10)$



4) $f(x) = x^4 - x^3 - 2x^2$
 $x^2(x^2 - x - 2)$
 $x^2(x-2)(x+1)$
 $x = 0, 2, -1$



$$\begin{array}{ccccccc} & & & & 0 & 0 & \\ & & & & -2 & -2 & \\ & & & & 0 & -2 & -2 \\ & & & & 1 & -1 & -2 \end{array}$$

$$5) f(x) = x^4 - 4x^2$$

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

$$x = 0 \quad x = \pm 2$$

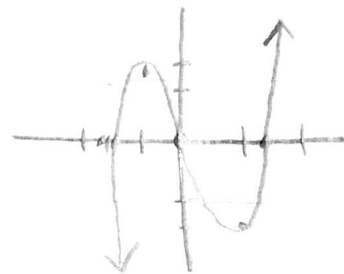


$$\begin{array}{r|l} 1 & -3 \\ -1 & -3 \end{array}$$

$$6) f(x) = x^3 - 3x$$

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

$$x = 0 \quad x = \pm\sqrt{3}$$



$$\begin{array}{r|l} -1 & 2 \\ 1 & -2 \end{array}$$

$$\begin{array}{r}
 x^2 - 2 \\
 x^2 + 0x - 1 \overline{) x^4 + 0x^3 - 3x^2 + 0x + 2} \\
 \underline{x^4 + 0x^3 - x^2} \\
 -2x^2 + 0x + 2 \\
 \underline{-2x^2 + 0x + 2} \\
 0
 \end{array}$$

$$\begin{array}{r}
 x^2 - x + 1 \\
 x^2 + 2x \overline{) x^4 + x^3 - x^2 + 2x} \\
 \underline{x^4 + 2x^3} \\
 -x^3 - x^2 \\
 \underline{-x^3 - 2x^2} \\
 x^2 + 2x \\
 \underline{x^2 + 2x} \\
 0
 \end{array}$$

$$\begin{array}{r}
 3 \quad -10 \quad 12 \quad -22 \\
 \underline{12 \quad 8 \quad 70} \\
 3 \quad 2 \quad 20 \quad 58
 \end{array}
 \quad 3x^3 + 2x + 20 + \frac{58}{x-4}$$

$$\begin{array}{r}
 2 \quad 6 \quad -14 \quad 9 \\
 \underline{2 \quad 8 \quad -6} \\
 2 \quad 8 \quad -6 \quad 3
 \end{array}
 \quad 2x^2 + 8x - 6 + \frac{3}{x-1}$$

$$\begin{aligned}
 11) \quad f(x) &= (6x^3 - 5x^2) + (24x - 20) \\
 &= x^2(6x - 5) + 4(6x - 5) \\
 &= (6x - 5)(x^2 + 4) \\
 x &= 5/6 \quad x = \pm 2i
 \end{aligned}$$

12) $f(x) = 6x^4 - 25x^3 + 14x^2 + 27x - 18$ poss: $\frac{\pm 1, 2, 3, 6, 9, 18}{1, 2, 3, 6}$

$$\begin{array}{r|rrrrr} -1 & 6 & -25 & 14 & 27 & -18 \\ & & -6 & 31 & -45 & 18 \\ \hline & 6 & -31 & 45 & -18 & 0 \\ 3 & & 18 & -39 & 18 & \\ \hline & 6 & -13 & 6 & 0 & \end{array}$$

$$x = -1, 3, \frac{2}{3}, \frac{3}{2}$$

$$6x^2 - 13x + 6 = 0$$

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

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

$$x = 2, 1 \pm i$$

$$\begin{array}{r|rrrr} 2 & 1 & -4 & 6 & -4 \\ & & 2 & -4 & 4 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$

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

$$x^2 - 2x + 1 = -2 + 1$$

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

$$x = 1 \pm i$$

14) $f(x) = x^4 + 10x^3 + 26x^2 + 10x + 25$

*no pos. zeros
(Descartes)

$$\begin{array}{r|rrrrr} -5 & 1 & 10 & 26 & 10 & 25 \\ & & -5 & -25 & -5 & -25 \\ \hline & 1 & 5 & 1 & 5 & 0 \end{array}$$

$$(x^3 + 5x^2 + x + 5) = 0$$

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

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

$$x = -5, -5, \pm i$$

$$15) \widehat{5i(13-8i)} \\ 65i - 40i^2 \\ \boxed{40 + 65i}$$

$$16) \widehat{(1+6i)(5-2i)} \\ 5 - 2i + 30i - 12i^2 \\ \boxed{17 + 28i}$$

$$17) \frac{(1-7i)(2-3i)}{(2+3i)(2-3i)} = \frac{2 - 3i - 14i + 21i^2}{4 - 6i + 6i - 9i^2} = \frac{-19 - 17i}{13}$$

$$18) -2, -2, -5i, 5i$$

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

$$(x^2 + 4x + 4)(x^2 + 25) =$$

$$x^4 + 25x^2 + 4x^3 + 100x + 4x^2 + 100$$

$$\boxed{x^4 + 4x^3 + 29x^2 + 100x + 100}$$

$$19) +, 4, 2i, -2i$$

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

$$(x^2 - 8x + 16)(x^2 + 4)$$

$$x^4 + 4x^2 - 8x^3 - 32x + 16x^2 + 64$$

$$\boxed{x^4 - 8x^3 + 20x^2 - 32x + 64}$$

$$20) 1, -4, -3+5i, -3-5i$$

$$(x-1)(x+4)(x-(-3+5i))(x-(-3-5i))$$

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

$$(x^2 + 3x - 4)(x^2 + 3x + 5ix + 3x + 9 + 15i - 5ix + 15i - 25i^2)$$

$$(x^2 + 3x - 4)(x^2 + 6x + 34)$$

$$\cancel{x^4} + \cancel{6x^3} + \cancel{34x^2} + \cancel{3x^3} + \cancel{18x^2} + 102x - \cancel{4x^2} - 24x - 136$$

$$\boxed{x^4 + 9x^3 + 48x^2 + 78x - 136}$$