

Homework #3B

10F4

Lesson 3B.1:

$$1) a) x^2 - 9x - 36 = (x - 12)(x + 3) = 0, x - 12 = 0, x = 12, x + 3 = 0, x = -3$$

$$b) ac = 16(-55) = -880 = -2^4 \cdot 5 \cdot 11 = tu, b = -18 = t + u, t = -40, u = 22$$

$$16x^2 - 18x - 55 = 16x^2 - 40x + 22x - 55 = 8x(2x - 5) + 11(2x - 5)$$

$$= (8x + 11)(2x - 5) = 0, 8x + 11 = 0, x = -\frac{11}{8}, 2x - 5 = 0, x = \frac{5}{2}$$

Lesson 3B.2:

$$2) a) \sqrt{-1.21} = 1.1i, b) (3i)^3 = 3^3 i^3 = 27i^2 i = -27i$$

$$c) \sqrt{-25} \cdot \sqrt{-49} = 5i \cdot 7i = 35i^2 = -35$$

$$3) a) (-3 + 5i) + (4 - 7i) = -3 + 4 + 5i - 7i = 1 - 2i$$

$$b) (-3 + 5i) - (4 - 7i) = -3 - 4 + 5i + 7i = -7 + 12i$$

$$c) (-3 + 5i)(4 - 7i) = -12 + 21i + 20i - 35i^2 = -12 + 35 + 41i = 23 + 41i$$

$$d) \frac{(-3 + 5i)(4 + 7i)}{(4 - 7i)(4 + 7i)} = \frac{-12 - 21i + 20i + 35i^2}{16 - 28i + 28i - 49i^2} = \frac{-12 - 35 - i}{16 + 49} = \frac{-47 - i}{65} = -\frac{47}{65} - \frac{1}{65}i$$

Lesson 3B.3:

$$4) x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(7)}}{2(1)} = \frac{4 \pm \sqrt{-12}}{2} = \frac{4 \pm \sqrt{4} \sqrt{-3}}{2} = \frac{4 \pm 2\sqrt{3}i}{2} = 2 \pm \sqrt{3}i$$

$$5) f(x) = [x - (3 - 4\sqrt{5})][x - (3 + 4\sqrt{5})] = x^2 - (3 + 4\sqrt{5})x - (3 - 4\sqrt{5})x + (3 - 4\sqrt{5})(3 + 4\sqrt{5}) = x^2 - 3x - 4\sqrt{5}x - 3x + 4\sqrt{5}x + 9 + 12\sqrt{5} - 12\sqrt{5} - 80 = x^2 - 6x - 71$$

$$x^2 = (3 \pm 4\sqrt{5})^2 = 9 \pm 24\sqrt{5} + 80 = 89 \pm 24\sqrt{5}$$

$$f(x) = x^2 - 6x - 71 = (89 \pm 24\sqrt{5}) - 6(3 \pm 4\sqrt{5}) - 71 = 89 \pm 24\sqrt{5} - 18 \mp 24\sqrt{5} - 71 = 89 - 18 - 71 = 0$$

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Lesson 38.4:

$$6) \begin{array}{r|rrrr} 2 & 6 & -22 & 16 & 11 \\ & & 12 & -20 & -6 \\ \hline & 6 & -10 & -4 & 3 \end{array}$$

$$f(x) = 6x^2 - 10x - 4 + \frac{3}{x-2}$$

$$7) \begin{array}{r|rrrr} -7 & 6 & 37 & -91 & -392 \\ & & -42 & 35 & 392 \\ \hline & 6 & -5 & -56 & 0 \end{array}$$

$$f(x) = 6x^2 - 5x - 56$$

Lesson 38.5:

8) a) $x = -3$ is a root, $x+3$ is a factor

$$b) \begin{array}{r|rrrr} -3 & 16 & 6 & -121 & 15 \\ & & -48 & 126 & -15 \\ \hline & 16 & -42 & 5 & 0 \end{array}$$

$$f(x) = (x+3)(16x^2 - 42x + 5)$$

$$ac = 16(5) = 80 = 2^4 \cdot 5 = tu, \quad b = -42 = t+u,$$

$$t = -40, \quad u = -2, \quad 16x^2 - 40x - 2x + 5 = 8x(2x-5) - 1(2x-5) = (8x-1)(2x-5)$$

$$f(x) = (x+3)(8x-1)(2x-5)$$

$$c) x = -3 \leftarrow x = \frac{1}{8} \leftarrow x = \frac{5}{2} \leftarrow$$

$$9) f(x) = (x-4)(2x-7)(5x+8) = (x-4)(10x^2 + 16x - 35x - 56) =$$

$$= (x-4)(10x^2 - 19x - 56) = 10x^3 - 19x^2 - 56x$$

$$-40x^2 + 76x + 224 = 10x^3 - 59x^2 + 20x + 224$$

10) a) $x = 2$ is a root, $x-2$ is a factor

$$b) \begin{array}{r|rrrr} 2 & 1 & -16 & 198 & -340 \\ & & 2 & -20 & 340 \\ \hline & 1 & -14 & 170 & 0 \end{array}$$

$$x^2 - 14x + 170 = 0$$

$$x = \frac{14 \pm \sqrt{(-14)^2 - 4(1)(170)}}{2(1)}$$

$$= \frac{14 \pm \sqrt{-484}}{2} = \frac{14 \pm 22i}{2} = 7 \pm 11i$$

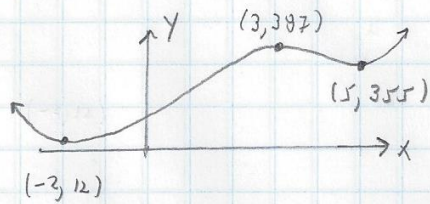
$$c) x\text{-int.: } x = 2 \leftarrow y\text{-int.: } y = f(0) = -340 \leftarrow$$

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Lesson 3B.6:

11) a) b)

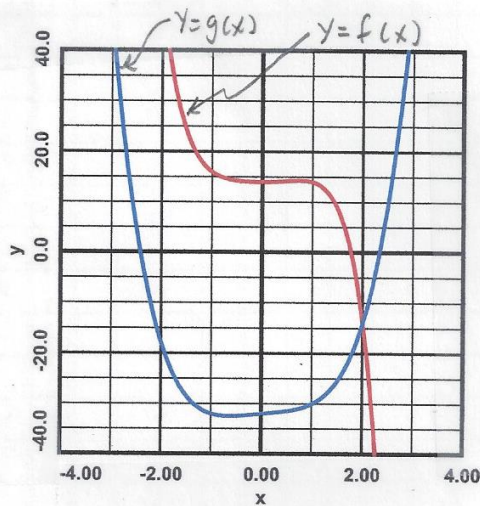


c) inc.: $-2 < x < 3$ and $5 < x < \infty$

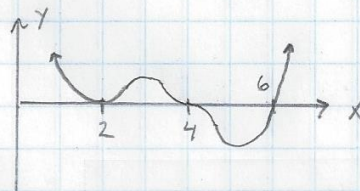
dec.: $-\infty < x < -2$ and $3 < x < 5$

Lesson 3B.7:

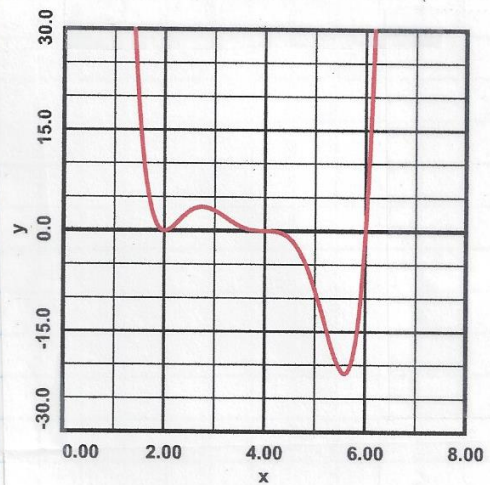
12)



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



14)



Lesson 3B.8:

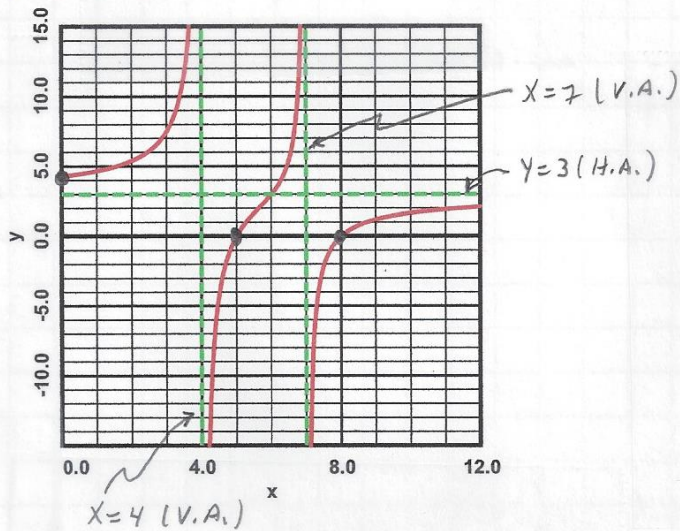
$$y = R(x) = \frac{3x^2 - 39x + 120}{x^2 - 11x + 20} = \frac{3(x^2 - 13x + 40)}{x^2 - 11x + 20} = \frac{3(x-5)(x-8)}{(x-4)(x-7)}$$

15) a) $y = 3$ b) $x = 4$ c) $x = 5$ d) $x = 8$ e) $y = \frac{120}{20} = 4.29$

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16)



Lesson 38.9:

17) $y = R(x) = \frac{2x^2 - x - 11}{x - 3}$

$$\begin{array}{r|rr} 3 & 2 & -1 & -11 \\ & 6 & 15 & \\ \hline & 2 & 5 & 4 \end{array}$$

$y = R(x) = 2x + 5 + \frac{4}{x - 3}$

a) $y = 2x + 5$

b) $x = 3$

c)

