Calculus I for Commerce Studies
Homework #1 (Sections 1.1 & 1.2)

Section 1.1:

37. False. Take $a = -2$, then $|-a| = |-(-2)| = |2| = 2 \neq a$.

38. True. If $b < 0$, then $b^2 > 0$, and $|b^2| = b^2$.

39. True. If $a - 4 < 0$, then $|a-4| = 4 - a = |4-a|$. If $a - 4 > 0$, then
$|4-a| = a - 4 = |a-4|$.

40. False. Let $a = -2$, then $|a+1| = |-2+1| = |-1| = 1 \neq |-2| + 1 = 3$.

41. False. Take $a = 3$, $b = -1$. Then $|a+b| = |3-1| = 2 \neq |a| + |b| = 3 + 1 = 4$.

42. False. Take $a = 3$, $b = -1$. Then $|a-b| = 4 \neq |a| - |b| = 3 - (1) = 2$.

89. $\sqrt[6]{64x^8y^3} = (64)^{1/6} \cdot x^{8/6}y^{3/6} = 2x^{4/3}y^{1/2}$.

87. $-\sqrt[4]{16x^4y^8} = -(16^{1/4} \cdot x^{4/4} \cdot y^{8/4}) = -2xy^2$.

Section 1.2:

32. $3x^3 - x^2 + 3x - 1 = x^2(3x - 1) + 1(3x - 1) = (x^2 + 1)(3x - 1)$.

37. $3x^2 - 6x - 24 = 3(x^2 - 2x - 8) = 3(x - 4)(x + 2)$.

53. $x^2 + x - 12 = 0$, or $(x + 4)(x - 3) = 0$, so that $x = -4$ o … hat the roots are $x = -4$ and $x = 3$.

61. We use the quadratic formula to solve the equation $8x^2 - 8x - 3 = 0$. Here $a = 8$, $b = -8$, and $c = -3$. Therefore,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(8)(-3)}}{2(8)} = \frac{8 \pm \sqrt{160}}{16}$$
$$= \frac{8 \pm 4\sqrt{10}}{16} = \frac{2 \pm \sqrt{10}}{4}.$$

Thus, $x = \frac{1}{2} + \frac{1}{4}\sqrt{10}$ and $x = \frac{1}{2} - \frac{1}{4}\sqrt{10}$ are the roots of the equation.

63. We use the quadratic formula to solve $2x^2 + 4x - 3 = 0$. Here, $a = 2$, $b = 4$, and $c = -3$. Therefore

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(4) \pm \sqrt{(4)^2 - 4(2)(-3)}}{2(2)} = \frac{-4 \pm \sqrt{40}}{4}$$

$$= \frac{-4 \pm 2\sqrt{10}}{4} = \frac{-2 \pm \sqrt{10}}{2}.$$

Thus, $x = -1 + \frac{1}{2}\sqrt{10}$ and $x = -1 - \frac{1}{2}\sqrt{10}$ are the roots of the equation.

74. $$\frac{3x^2 - 4xy - 4y^2}{x^2 y} \div \frac{(2y - x)^2}{x^3 y} = \frac{(3x + 2y)(x - 2y)}{x^2 y} \cdot \frac{x^3 y}{(2y - x)(2y - x)} = \frac{x(3x + 2y)}{x - 2y}.$$

79. $$\frac{4}{x^2 - 9} - \frac{5}{x^2 - 6x + 9} = \frac{4}{(x+3)(x-3)} - \frac{5}{(x-3)^2}$$

$$= \frac{4(x-3) - 5(x+3)}{(x-3)^2(x+3)} = -\frac{x + 27}{(x-3)^2(x+3)}.$$

91. $$\frac{1}{\sqrt{x} - \sqrt{y}} \cdot \frac{\sqrt{x} + \sqrt{y}}{\sqrt{x} + \sqrt{y}} = \frac{\sqrt{x} + \sqrt{y}}{x - y}.$$

92. $$\frac{a}{1 - \sqrt{a}} \cdot \frac{1 + \sqrt{a}}{1 + \sqrt{a}} = \frac{a(1 + \sqrt{a})}{1 - a}.$$

93. $$\frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} - \sqrt{b}} \cdot \frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} + \sqrt{b}} = \frac{(\sqrt{a} + \sqrt{b})^2}{a - b}.$$

94. $$\frac{2\sqrt{a} + \sqrt{b}}{2\sqrt{a} - \sqrt{b}} \cdot \frac{2\sqrt{a} + \sqrt{b}}{2\sqrt{a} + \sqrt{b}} = \frac{(2\sqrt{a} + \sqrt{b})^2}{4a - b}$$