Math 1314 – College Algebra   ***Exam* 1**   *Review*
Professor: Fred Khoury

1.   Solve the following equations:

   a) $20x + 5(x+1) = 25(x+1) - 20$

   b) $25 - [2 + 5y - 3(y+2)] = -3(2y-5) - [5(y-1) - 3y + 3]$

   c) $5 - \dfrac{x-4}{3} = \dfrac{x+3}{8}$

   d) $\dfrac{2x}{x-1} = 5 + \dfrac{2}{x-1}$

   e) $\dfrac{-4}{2x+3} + \dfrac{1}{x-1} = \dfrac{1}{2x^2 + x - 3}$

   f) $6x^2 - 17x + 12 = 0$

   g) $3(x-3)^2 = -84$

   h) $7x = 3 - 6x^2$

   i) $3(x-3)^{3/2} = 8$

   j) $2x^2 + 12x + 3 = 0$

   k) $x^2 + x + 2 = 0$

   l) $\sqrt[3]{5x+7} = -2$

   m) $\sqrt{4x+5} = 2x - 5$

   n) $4x - 5 = 16x^3 - 20x^2$

   o) $4x^4 - x^2 - 3 = 0$

   p) $x - 2\sqrt{x} + 1 = 0$

   q) $x^{2/3} + x^{1/3} - 12 = 0$

   r) $x^{1/2} - 4x^{1/4} + 3 = 0$

   s) $2|5 - 3m| - 4 = 20$

2.   Solve for t: $A = P + \operatorname{Pr}t$

3.   Solve for c: $A = \dfrac{1}{2}h(b+c)$

4.   Solve for x: $\dfrac{1}{x} + \dfrac{1}{y} = b$

5.   Solve the following inequalities and express the solutions in interval notation.

   a) $2(y+7) > 2(4y+1) - 3y$

   b) $\dfrac{x}{5} + \dfrac{1}{3} \le \dfrac{x}{2} + 1$

   c) $-13 \le 7 + 4x < 17$

   d) $|3z+1| - 9 > -2$

   e) $|6x+3| < -3$

   f) $|6x+3| \ge -7$

   g) $2x^2 - 9x + 4 \le 0$

   h) $-x^2 < 5x$

   i) $2x^2 - 3x - 2 > 0$

   j) $x^3 + x^2 \ge 48x$

   k) $\dfrac{3-x}{x+5} \ge 0$

   l) $\dfrac{x-2}{x+3} \le 4$

6.   A student bought a new car for a total of $21,492, including sales tax. If the sales tax rate is 8%, then what amount of tax did she pay?

7.   The length of a rectangle is 2 feet longer than three times its width. If the perimeter of the rectangle is 92 feet, find the length and width of the rectangle.

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8. Sybil is having her yard landscaped. She obtained an estimate from two landscaping companies. Company *A* gave an estimate of $190 for materials and equipment rental plus $45 per hour for labor. Company *B* gave an estimate of $280 for materials and equipment rental plus $30 per hour for labor. Determine how many hours of labor will be required for the two companies to cost the same.

9. Kevin has $15,000 to invest. He invested some of the money in corporate bonds that pay 12% and the rest in government-backed Treasury bonds paying 4%. If he earned $1350 interest in one year, how much did he place in each investment?

10. The length of a rectangle is 4 inches shorter than twice the width. Its area is 96 square inches. Find its dimensions.

11. The height of a projectile fired upward from the ground with an initial velocity of 128 *ft./s* is given by $s = -16t^2 + 128t$, where *s* is the height in feet and *t* is the time in seconds. Find the times at which the projectile will be 192 feet above the ground.

12. The diagonal of a rectangle is 30 inches. If the width is 6 inches less than the length, find the dimensions of the rectangle.

13. A rectangular piece of metal is 10 *in.* longer than it is wide. Squares with sides 2 *in.* long are cut from the four corners, and the flaps folded upward to form an open box. If the volume of the box is 832 in^3, what were the original dimensions of the piece of metal?

14. An open box is made from a 10-*cm* by 20-*cm* piece of tin by cutting a square from each corner and folding up the edges. The area of the resulting base is 96 cm^2. What is the length of the sides of the squares

10 cm

20 cm
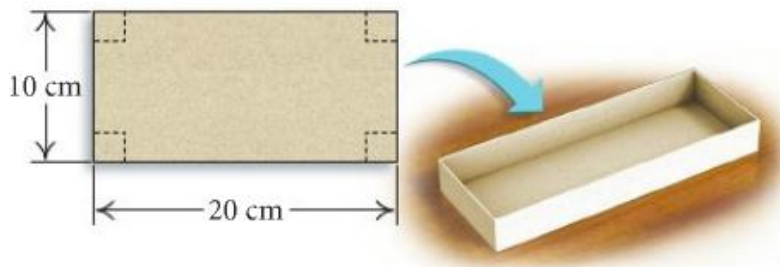
15. The hypotenuse of a right triangle is 50 *ft*. One leg is 10 *ft*. longer than the other. What are the lengths of the legs?

50 ft

x + 10

x
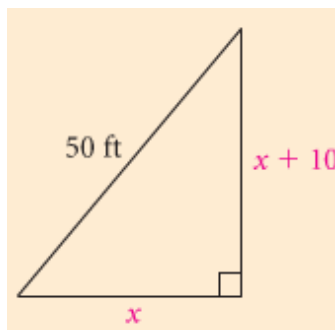
16. The frame on a picture is 8 *in.* by 10 *in.* outside and is uniform width. What is the width of the frame if 48 *in²* of the picture shows?

8 in.

10 in.

Solution

1.

   a)   All Real Numbers

   b) $y = -2$

   c) $x = 13$

   d)   No Solution

   e) $x = 3$

   f) $x = \left\{\dfrac{4}{3}, \dfrac{3}{2}\right\}$

   g) $x = 3 \pm 2i\sqrt{7}$

   h) $x = \left\{-\dfrac{3}{2}, \dfrac{1}{3}\right\}$

   i) $x = 3 + \dfrac{4}{\sqrt[3]{9}}$ *or* $x = 3 + \dfrac{4}{3}\sqrt[3]{3}$

   j) $\dfrac{-6 \pm \sqrt{30}}{2}$

   k) $-\dfrac{1}{2} \pm \dfrac{\sqrt{7}}{2} i$

   l) $x = -3$

   m) $x = 5$

   n) $x = \left\{\dfrac{5}{4}, \pm\dfrac{1}{2}\right\}$

   o) $x = \left\{\pm 1, \ \dfrac{\pm i\sqrt{3}}{2}\right\}$

   p) $x = 1$

   q) $x = \{-64, \ 27\}$

   r) $x = 1, \ 81$

   s) $m = \left\{-\dfrac{17}{3}, \dfrac{7}{3}\right\}$

2. $t = \dfrac{A - P}{Pr}$

3. $c = \dfrac{2A - hb}{h}$ or $c = \dfrac{2A}{h} - b$

4. $x = \dfrac{y}{by - 1}$ or $x = \dfrac{-y}{1 - by}$

5.

   a) $(-\infty, 4)$

   b) $\left[\dfrac{20}{9}, \infty\right)$

   c) $\left[-5, \dfrac{5}{2}\right)$

   d) $(2, \infty)$

   e)   No Solution

   f) $(-\infty, \infty)$

   g) $\left[\dfrac{1}{2}, 4\right]$

   h) $(-\infty, -5) \cup (0, \infty)$

   i) $\left(-\infty, -\dfrac{1}{2}\right) \cup (2, \infty)$

   j) $\left[\dfrac{-1 - \sqrt{193}}{2}, 0\right] \cup \left[\dfrac{-1 + \sqrt{193}}{2}, \infty\right)$

   k) $(-5, 3]$

   l) $\left(-\infty, -\dfrac{14}{3}\right] \cup (-3, \infty)$

6.   \$1592

7.   Length 35 ft and width 11 ft.

8.   6 hrs.

9.   \$9375 in 12% and \$5625 4%.

10.   The length 12 in. and the width 8 in.

11. $t = 2$ and 6 sec. height 192 ft

12. Length 24 in. and width 18 in.

13. Length 30 in. and width 20 in.

14. $x = 2$

15. $x = 30$

16. $x = 1$