EXAM REVIEW

MATH 1314 –SPRING 2017 - KONDEH

1. Solve by completing the square and applying the square root property.

$$-4m^2 - 12mm + 5 = 0$$

Solution

Given $-4m^2 - 12m + 5 = 0$

Equation in form $ax^2 + bx + c = 0$

Step 1 - divide by the leading coefficient -4

$$\frac{-4m^2}{-4} - \frac{12m}{-4} + \frac{5}{-4} = \frac{0}{-4}$$

$$m^2 + 3m - \frac{5}{4} = 0$$

$$m^2 + 3m = \frac{5}{4}$$

Step 2 Add one half the linear term coeff on both sides.

$$\left[\frac{1}{2}\cdot(3)\right]^2 = \left[\frac{3}{2}\right]^2 = \frac{9}{4} \text{ to both sides}$$

$$m^2 + 3m + \frac{9}{4} = \frac{5}{4} + \frac{9}{4}$$

factor $\left(m + \frac{3}{2}\right)^2 = \frac{14}{4}$

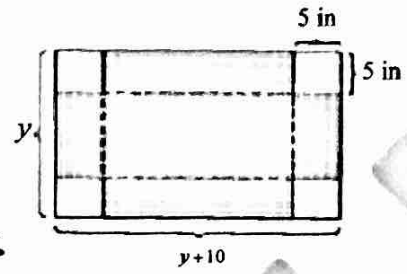
$$m + \frac{3}{2} = \pm\sqrt{\frac{14}{4}}$$

Simplify the radical

$$m = -\frac{3}{2} \pm \frac{\sqrt{14}}{2}$$

Solution Set $\left\{-\frac{3}{2} \pm \frac{\sqrt{14}}{2}\right\}$

2. Ousman plans to make several open-topped boxes in which to carry plants. He makes the boxes from rectangular sheets of cardboard from which he cuts out 5-in. squares from each corner. The length of the original piece of cardboard is 10 in. kore than the width. If the volume of the box is 1680 in.^{2}, determine the dimensions of the original piece of cardboard



Try this ?

3. Solve by using the quadratic formula

$$-7z+5=-6z^2$$

$6z^2-7z+5=0$

$a=6,\ b=-7,\ c=5$

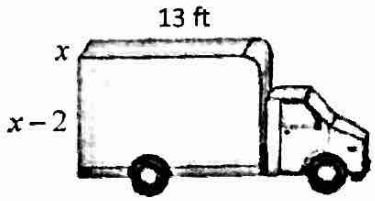
$$z=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$z=\frac{-(-7)\pm\sqrt{(-7)^2-4(6)(5)}}{2(6)}$$

$$=\frac{7\pm\sqrt{-71}}{12}$$

$$\boxed{z=\frac{7\pm i\sqrt{71}}{12}}$$

4. On moving day, Kondeh needs to rend a truck. The length of the cargo space is 13 ft., and the height is 2 ft less than the width. The brochure indicates that the truck can hold 455 ft^3. What are the dimensions of the cargo space? Assume that the cargo space is in the shape of a rectangular solid



Given

The length is 13 ft

height $(x-2)$

width x

The volume

$V = \ell w h$

$V = 455$ $\quad 455 = 13(x)(x-2)$

$455 = 13x^2 - 26x$

$13x^2 - 26x - 455 = 0$

$13(x^2 - 2x - 35) = 0$

either $13 = 0$, $(x+5)(x-7) = 0$

$13 = 0$ or $x+5 = 0$ or $x-7 = 0$

$13 = 0$, $x = -5$ or $x = 7$

x must be positive.

Hence $x = 7$ ft

dimension is 5ft, by 7ft, by 13ft

5. Find the shortest distance from the origin to a point on the circle defined by

$$x^2 + y^2 + 2x - 14y + 25 = 0$$

Group like terms.

$(x^2 + 2x \quad) + (y^2 - 14y \quad) = -25$

complete the square.

$\left[\frac{1}{2}(2)\right]^2 = 1$, $\left[\frac{1}{2}(-14)\right]^2 = 49$

$(x^2 + 2x + 1) + (y^2 - 14y + 49) = -25 + 49 + 1$

$(x+1)^2 + (y-7)^2 = 25$

radius $r = \sqrt{25} = 5$

origin $(0, 0)$ and $(-1, 7)$

cont'n

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(-1-0)^2 + (7-0)^2}$

$d = \sqrt{50}$

$d = 5\sqrt{2}$

shortest distance = length of line − length of radius

$= 5\sqrt{5} - 5$

6. Determine the center and radius of the circle

$$\left(x-\frac{4}{7}\right)^2+\left(y+\frac{1}{2}\right)^2=\frac{9}{25}$$

Given a circle centered at (h, k)

$(x-h)^2+(y-k)^2=r^2 \quad r>0$

$\left(x-\frac{4}{7}\right)^2+\left[y-\left(\frac{1}{2}\right)\right]^2=\left(\frac{3}{5}\right)^2$

Center $\left(\frac{4}{7}, -\frac{1}{2}\right)$ $r=\frac{3}{5}$

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7. Write the equation in the form $(x-h)^2+(y-k)^2=c$. Identify the center radius

$$x^2+y^2+10x+4y+4=0$$

Group the x-terms, y-terms

$(x^2+10x\ \ )+(y^2+4y)=-4$

Complete the square

$\left(\frac{1}{2}\cdot 10\right)^2=25$, $\left(\frac{1}{2}\cdot 4\right)^2=4$

$(x^2+10x+25)+(y^2+4y+4)=-4+25+4$

factor. $(x+5)^2+(y+2)^2=25$

Center: $(-5,-2)$ radius: $\sqrt{25}=5$

8. Solve the equation

$$\frac{48}{m^2-4m}+3=\frac{12}{m-4}$$

Factor the denominator

$\frac{48}{m(m-4)}+3=\frac{12}{m-4}$

LCD = $m(m-4)$

$m(m-4)\left[\frac{48}{m(m-4)}+3\right]=m(m-4)\left(\frac{12}{m-4}\right)$

$48+3m(m-4)=12m$

$48+3m-12=12m$

$3m^2-24m+48=0$

Cont.

$3(m^2-8m+16)=0$

$3(m-4)^2=0$

$3=0$ or $m=4$

$m=4$ is not a solution because it is a restricted value.

The solution set is $\{\ \}$

9. Solve the inequality, and write the solution set in interval notation

$$3|8+x|-3 \geq 12$$

$3|8+x| \geq 12+3$

$3|8+x| \geq 15$

$|x+x| \geq 5$

If $|u| \geq k$,

$u \leq -k$ or $u \geq k$

$8+x \leq -5$ or $8+x \geq 5$

$x \leq -13$ or $x \geq -3$

Solution set

$\{x \mid x \leq -13 \text{ or } x \geq -3\}$

Solution set in interval notation

$(-\infty, -13] \cup [-3, \infty)$

10. Evaluate the function $f(x) = \sqrt{x+1}$ for the given value of x. Simplify your answer

$f(x+h)$

Substitute $x+h$ for x

$f(x+h) = \sqrt{(x+h)+1}$

$= \sqrt{x+h+1}$

11. Write the domain in interval notation

a. $g(x) = \dfrac{x-9}{x^2-64}$

b. $c(x) = \dfrac{1}{\sqrt{x+36}}$

c. $g(x) = \dfrac{x+3}{x^2-2x-8}$

12. Use the model

$$S = -\frac{1}{2}gt^2 + V_o t + S_o \quad \text{with } g = 32 ft/\sec^2 \quad \text{or } g = 9.8 m/\sec^2$$

Kondeh tosses a loaf of bread (a marble rye) straight upwards to his friend Ousman who is leaning out of a third-story window

a) If the loaf of bread leaves Kondeh's hand at a height of 1m with an initial velocity of 22m/sec. Write an equation for the vertical position of the bread s (in meters) t seconds after release

b) How long will it take the bread to reach Ousman if he catches the bread on the way up at a height of 13m? Round to the nearest tenth of a second

13. Solve the equation

$$|5z + 2| = |z + 6|$$

$5z+2 = z+6$ or $5z+2 = -(z+6)$

$4z = 4$ $\quad 5z+2 = -z-6$

$z = \frac{4}{4}$ $\quad 6z = -8$

$z = 1$ $\quad z = -\frac{8}{6}$

$z = -\frac{4}{3}$

14. Solve the equation

$$\frac{5q}{q+2} - \frac{5}{q+1} = \frac{4q^2+3q}{q^2+3q+2}$$

15. Solve the inequality, and write the solution set in interval notation

$$-2 \le \frac{5x-2}{2} \le 5$$

b) Graph the solution set

16. Given a circle where the center is (-2, 6) and another point on the circle is (-8, -2)

a) Write an equation of the circle in standard form

b) Graph the circle

17. Write the equation in slope-intercept form, and determine the slope and y-intercept

$$\frac{x}{2}+\frac{y}{4}=1$$

18. Determine the average rate of change of the function on the given interval [-2, 0]

$$k(x)=x^{3}+3$$

19. Kondeh Ltd, charges \$49 for each lawn maintenance call. The company fixed monthly cost of \$685 includes telephone services and depreciation of equipment. The variable cost include labor, gasoline, and taxes and amount to \$38 per lawn

a) Write a linear cost function representing the monthly cost $C(x)$ for x maintenance

b) Write a linear revenue function representing the monthly revenue $R(x)$ for x maintenance

c) Write a linear profit function $p(x)$ for x maintenance calls

20. At a parking garage at the Houston Community College- Pinmont Campus, the charge for parking for student consists of a flat rate fee of \$1.00 plus \$1.4/hrs

a) Write a linear function to model the cost for parking P(t) for t hour

b) Evaluate P(1.2) and interpret the meaning in the context of this problem