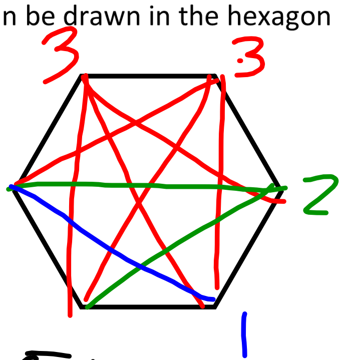
Bellwork: ACT Prep

- What is the maximum number of distinct diagonals that can be drawn in the hexagon shown below?
- A. 4
- B. 5
- C. 6
- D. 9
- E. 12



A flight instructor charges $50 per lesson, plus an additional fee for the use of his plane. The charge for the use of the plane varies directly with the square root of the time the plane is used. If a lesson plus 16 minutes of plane usage costs $90, what is the total amount charged for a lesson having 36 minutes of plane usage?

A. $185 B. $150 C. $135 D. $110 E. $ 60

$90 = 50 + k\sqrt{16}$

$40 = 4k$

$\frac{40}{\sqrt{16}} = 10 \cdot \sqrt{36}$

$50 + 10\sqrt{36}$

Homework 6.1 Solutions:

1. x=-6, -4
2. x=3, 8/3 or 2.66
3. x= 1
4. x=1
5. x=11/2, -29/6 or 5.5, -4.833
6. x=-4/3, -2/3 or -1.33, -0.66
7. x= ~~3, -1/2~~ 27, -1/8
8. x=$\sqrt{27}$ or 5.196
9. x=0, 1/9 or .111
10. x=0,1
11. x= 0, 4, -4
12. x=0,$\sqrt{5}$, -$\sqrt{5}$, or 0, 2.24, -2.24

8) $x^{4/3} - 6x^{2/3} + 9 = 0$

$(u)^2 = (x^{2/3})^2$

$u^2 = x^{4/3}$

$u^2 - 6u + 9 = 0$

$(u-3)(u-3) = 0$

$u = 3$

$(x^{\cancel{2/3}})^{\cancel{3}} = 3^3$

$\sqrt{x^2} = \sqrt{27}$

$x = \sqrt{27} = 3\sqrt{3}$

$= 5.1$

11) $x^3 = 16x$

$x^3 - 16x = 0$

$x(x^2 - 16) = 0$

$x(x+4)(x-4) = 0$

$x = 0$

$x + 4 = 0$

$x - 4 = 0$

$\boxed{x = 0, -4, 4}$

Lesson 6.2 Objectives:

I can create inequalities in one variable and use them to solve problems

When solving inequalities:

1. Make one side equal to zero
2. Find where the function is undefined and where it equals zero
3. Create a sign chart using the zeros to determine where the function is positive and negative

Solve $(x-2)\sqrt{x+3} \ge 0$

$x-2=0$

$x=2$

$\left(\sqrt{x+3}\right)^2 = 0^2$

$-3 \quad -3$

$x=-3$

undefined $\quad -3 \quad$ − $\quad 2 \quad$ +

U.D. $\quad$ z $\quad$ z

$(2)(\sqrt{7})$

$(-84-2)\sqrt{-84+3}$ $\quad (-2)\sqrt{3}$

$(-86)\sqrt{-81} = i$

$[-3] \cup [2, \infty)$

Solve $\frac{x-5}{|x+1|} \le 0$

$x - \cancel{5} = 0$ $+5$
$\quad \cancel{+5}$

$x + \cancel{1} = 0$ -1
$\quad \cancel{-1}$

$-$ $\quad -1 \quad$ $-$ $\quad 5 \quad$ $+$

U.D. $\quad$ z

$\frac{-8}{|-2|}$ $\quad \frac{-8}{2}$ $\quad \frac{-5}{1}$ $\quad \frac{+}{+}$

$(-\infty, -1) \cup (-1, 5]$

5) $(3x-4)\sqrt{2x+1} \ge 0$

$\cancel{3}x - \cancel{4} = 0$ $\frac{+4}{3}$
$\quad \cancel{3} \quad \cancel{+4}$

$2x + 1 = 0$

$-1/2 \quad$ $-$ $\quad 4/3 \quad$ $+$

U.D. $\quad$ z $\quad$ z

$(-7)\sqrt{-1}$ $\quad (-1)(\sqrt{3})$ $\quad (2)(\sqrt{5})$

$-7i$

$[-\frac{1}{2}] \cup [4/3, \infty)$

When solving contextual type problems it is important to:

- Identify what you know.
- Determine what you are trying to find.
- Draw a picture to help you visualize the situation when possible. Remember to label all parts of your drawing.
- Use familiar formulas to help you write equations.
- Check your answer for reasonableness and accuracy.
- Make sure you answered the entire question.
- Use appropriate units.

8) Fixed monthly cost: 25,000

Cost per calc: 75

Avg mon. cost per calc $\leq$ 125

$$c \cdot \frac{25000 + 75c}{\cancel{c}} \leq 125 \cdot c$$

$$25000 + \cancel{75c} \leq 125c$$
$$\quad -\cancel{75c} \qquad -75c$$

$$\frac{2500\cancel{0}}{5\cancel{0}} \leq \frac{5\cancel{0}c}{\cancel{50}} \qquad 500 \leq c$$

$[500, \infty)$

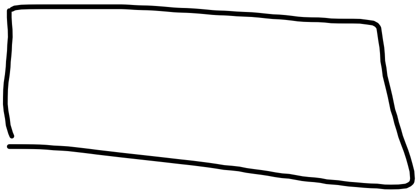
make at least 500 calculators

The length of a rectangle is five more than the twice the width. If the area is at least 75 square centimeters, what are the possible values for the width?

$A = lw$

$l = 2w + 5$

w



$75 \le lw$

$75 \le (2w+5)w$ -75

-75

$0 \le 2w^2 + 5w - 75$

$0 \le (w-5)(w+\frac{15}{2})$

-150

$\frac{-10}{2}$ $\frac{15}{2}$

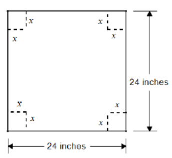
5

$(+)$ -7.5 $(-)$ 5 $+$

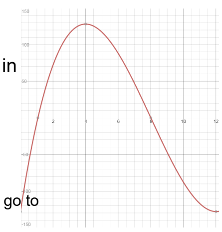
$(-3)(+)$ $(2)(+)$

$\boxed{\text{w: } [5, \infty) \quad \text{width is at least 5}}$

A packaging company is designing a new open-topped box with a volume of at least 512 in^3. The box is to be made from a piece of cardboard measuring 24 inches by 24 inches by cutting identical squares from the corners and turning up the sides. Describe the possible lengths of the sides of the removed squares.



Graph in calculator, then change in window Xmin=0, Xmax=12, Ymin=-150, Ymax=150



To find the zeros, press 2nd TRACE 2: zero

Left Bound?: Use the left and right arrows to go to the left of an x-intercept and hit ENTER

Right Bound?: Use the left and right arrows to go to the right of the same x-intercept and hit ENTER

Guess?: hit ENTER

Repeat to find all x-intercepts

x= 1.07 and 8 are our zeros between 0 and 12. We can see on the graph that the function is positive between 1.07 and 8, so if we cut out between 1.07 inches and 8 inches, we will achieve a volume greater than 512 in^3.