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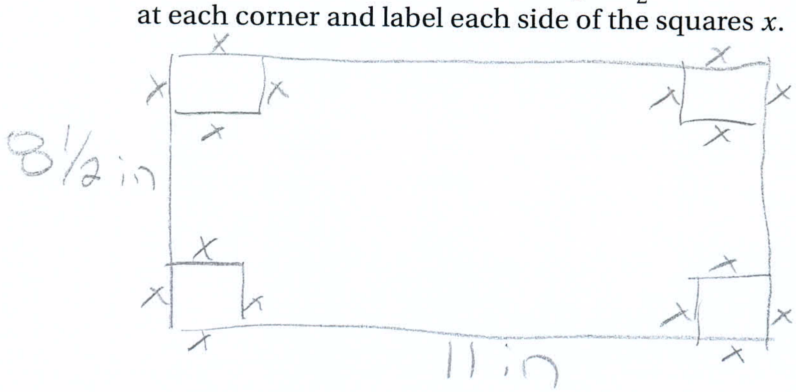
SLCC **Math 1050 Project**

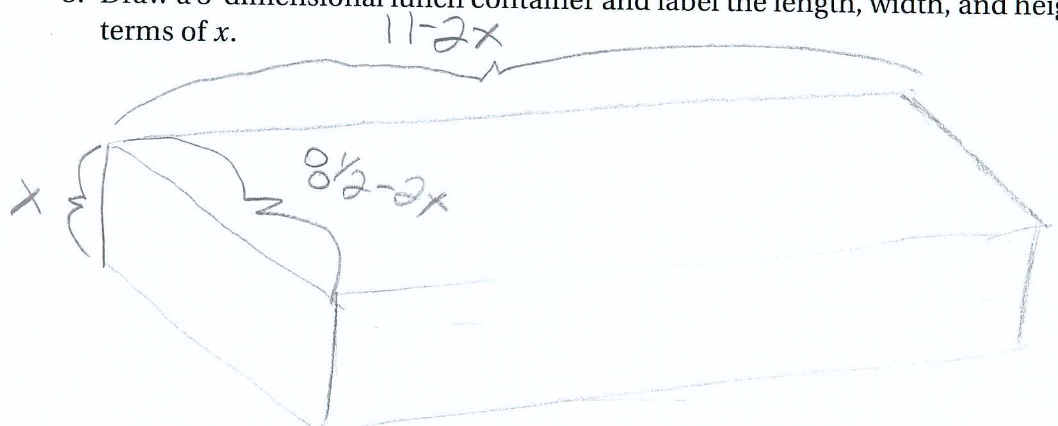
1. In your own words, write a paragraph to describe what this project is about.

This project is about Creating food containers for a third world country that just had a disaster. We are to use what we have learned in class to Complete this project.

2. Draw a rectangle and label the length $8\frac{1}{2}$ inches and the width 11 inches. Put a square at each corner and label each side of the squares x.



3. Draw a 3-dimensional lunch container and label the length, width, and height in terms of x.



4. State the volume of the open box, $v(x)$, in terms of x, in descending order.

$V = l \cdot w \cdot h$

$11 - 2x\,(x)$

$11x - 2x^2\,(8\tfrac{1}{2} - 2x)$ $\quad 93\tfrac{1}{2} - 22x^2 - 17x^2 + 4x^3$

$4x^3 - 39x^2 + 93\tfrac{1}{2}x$

5. State the inequality if we want the volume of the open box to be at least $37\frac{1}{2}$ cubic inches.

$\geq$

$4x^3 - 39x^2 + 93\tfrac{1}{2}x \geq 37\tfrac{1}{2}$

Solve the inequality by following the next steps.

6. Make the right side of the inequality zero by adding or subtracting the same value on both sides.

$4x^3 - 39x^2 + 93\tfrac{1}{2}x - 37\tfrac{1}{2} \geq 0$

$4x^3 - 39x^2 + 93\tfrac{1}{2}x - 37\tfrac{1}{2} \geq 0$

7. Multiply both sides of the inequality by the smallest positive number so that all the coefficient of the inequality are integers.

$2(4x^3 - 39x^2 + 93\tfrac{1}{2}x - 37\tfrac{1}{2} \geq 0)$

$8x^3 - 78x^2 + 187x - 75 \geq 0$

$8x^3 - 78x^2 + 187x - 75 \geq 0$

8. Let the left side of the inequality be $f(x)$.

$f(x) = 8x^3 - 78x^2 + 187x - 75$

9. Use the Rational Zero Theorem to state all possible rational zeros for $f(x)$.

$\frac{p}{q}$

$p: \pm 1, \pm 5, \pm 15, \pm 25, \pm 75$

$q: \pm 1, \pm 2, \pm 4, \pm 8$

$\pm 1, \pm 5, \pm 15, \pm 25, \pm 75, \pm\frac{1}{2}, \pm\frac{5}{2}, \pm\frac{15}{2}, \pm\frac{25}{2}, \pm\frac{75}{2}, \pm\frac{1}{4}, \pm\frac{5}{4}, \pm\frac{15}{4}, \pm\frac{25}{4}, \pm\frac{75}{4}, \pm\frac{1}{8}, \pm\frac{5}{8}, \pm\frac{15}{8}, \pm\frac{25}{8}, \pm\frac{75}{8}$

Use synthetic division complete the following.

10. Find $f(x)$ with $x = 1$.

$8x^2-70x+117$ R 192

$$\begin{array}{r|rrrr} 1 & 8 & -78 & 137 & 75 \\ & & 8 & -70 & 117 \\ \hline & 8 & -70 & 177 & 192 \end{array}$$

11. Find $f(x)$ with $x = \frac{1}{2}$.

$8x^2-74x+150$

$$\begin{array}{r|rrrr} \frac{1}{2} & 8 & -78 & +197 & -75 \\ & & +4 & -37 & 75 \\ \hline & 8 & -74 & +150 & 0 \end{array}$$

1 −19.5 +93.5 −75

12. Call the depressed equation (see p. 379) $g(x)$.

$8x^3-78x+137x-75$

$(4x-25)(2x-6)$

$8x^2+24x-50x+150$ $8x^2-26x+150$

$g(x) =$ $(4x-25)(2x-6) = 8x^2-26x+150$

13. Find $g(x)$ with $x = 3$.

144

$8(3)^2-26(3)+150$

$8(9)-78+150$

$72-78+150$

$-6+150 = 144$

14. Factor $f(x)$ completely.

$(4x-25)(2x-6)(x-\frac{1}{2})$

15. State the x values that one can use to design an open rectangular container with a $8\frac{1}{2}$ inches by 11 inches cardboard so that the volume is at least $37\frac{1}{2}$ cubic inches.

$x-\frac{1}{2}=0$

$x=\frac{1}{2}$

$4x-25=0$

$\frac{4x}{4}=\frac{25}{4}$

$x=\frac{25}{4}$

$2x-6=0$

$\frac{2x}{2}=\frac{-6}{2}$

$x=-3$

$x = \frac{1}{2}, \frac{6}{2}, \frac{25}{4}$