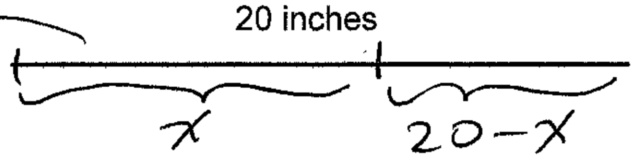
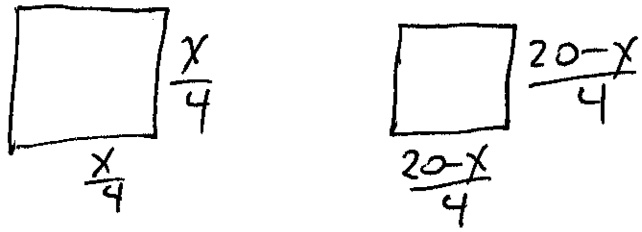
Ex: A 20 inch wire is cut into two pieces, where each piece is used to form a square.



1) Express the total area as a function of the length of one of the pieces.

2) Find the length of each piece that would maximize the area.

If we bend length of x into a square, then each side will be $\frac{x}{4}$



$$1)\ A = \frac{x}{4}\left(\frac{x}{4}\right) + \frac{20-x}{4}\,\frac{20-x}{4}$$

$$= \frac{1}{16}x^2 + \frac{1}{16}(20-x)(20-x)$$

$$= \frac{1}{16}x^2 + \frac{1}{16}(400 - 40x + x^2)$$

$$= \frac{1}{16}x^2 + \frac{400}{16} - \frac{40}{16}x + \frac{x^2}{16}$$

$$= \frac{1}{16}(2x^2 - 40x + 400)$$

$$= \frac{1}{8}(x^2 - 20x + 200)$$

$$2)\ x = \frac{-b}{2a} = \frac{-(-20)}{2(1)} = 10$$

Both pieces would be 10 inches.

Ex: Graph

$$P(x) = \underbrace{x^4 - 2x^3} + \underbrace{8x - 16}$$

$$= x^3(x-2) + 8(x-2)$$

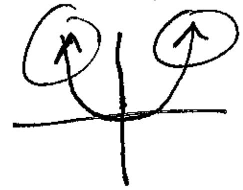
$$= (x^3+8)(x-2)$$

$$= (x+2)\underbrace{(x^2-2x+4)}(x-2)$$

No x-int from this factor

1) x-int $= -2$ $\qquad$ x-int $= 2$

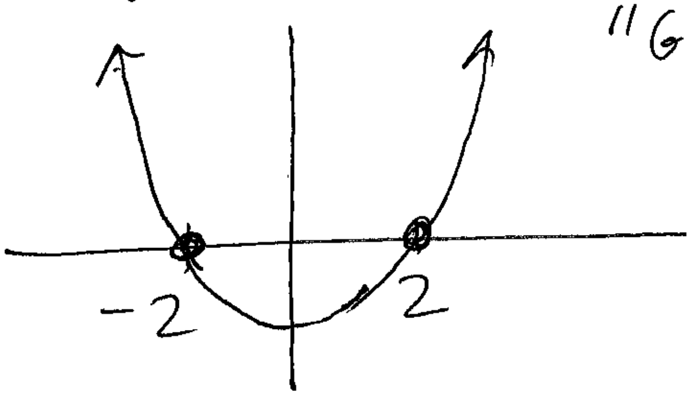
2) leading term $= x^4$



3) sign chart

		-2		2	
$x+2$	$-$	0	$+$		$+$
x^2-2x+4	$+$		$+$		$+$
$x-2$	$-$		$-$	0	$+$
	$+$	-2	$-$	2	$+$

4) Graph



"Graph given info found above"