Name_____

Date_____

We introduced power rule derivative

As a way to find maximum

Advanced Algebra

Unit 5 Polynomials: Assignment #14

1) Re-write the following and show the long division process.

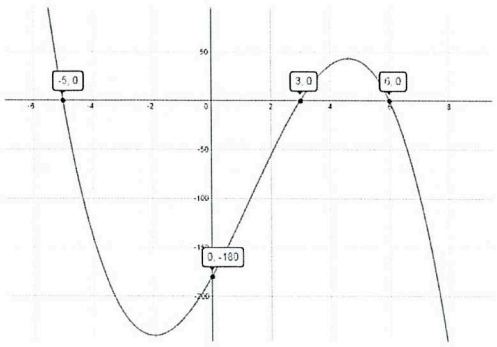
2) Find the Roots of the original polynomial

3) Sketch a graph of the polynomial

1) $x^3 -5x^2 -2x +24 \div (x+2)$	2) $(x^3 -3x^2 -16x -12) \div (x-6)$
3) $(x^3 -12x^2 +12x +80) \div (x-10)$	4) $(x^3-18x^2+95x-126) \div (x-9)$
5) $(x^3 - x^2 -21x +45) \div (x+5)$	6) $(x^3 - 11x^2 +14x +80) \div (x-8)$
7) $(4x^3-4x^2-9x+9) \div (x-1)$	8) $(2x^3 +7x^2 -33x -18) \div (x+6)$
9) $(x^3-8x^2 +4x+48) \div (x-4)$	10) $(2x^3-14x^2-56x-40) \div (x-10)$
11) $(6x^3 + 8x^2 +x-6) \div (3x-2)$	12) $(3x^3 +22x^2 +38x +15) \div (x+5)$

Review: I can write the equation of a polynomial graph.

Write the equation of the following:



Review: I can complete the square:

$Y= x^2 + 8x - 16$

$y = 2x^2-6x + 18$

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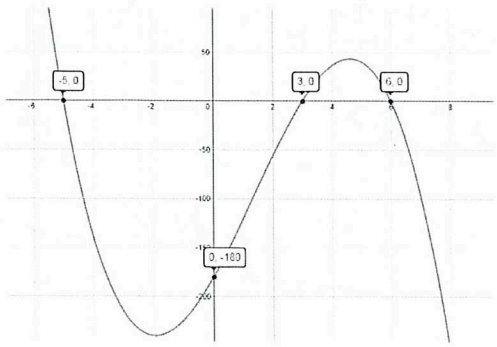
Review: I can write the equation of a polynomial graph.

Write the equation of the following:



$y = a(x+5)(x-3)(x-6)$ point $(0, -180)$

$-180 = a(5)(-3)(-6)$

$-180 = 90a$

$-2 = a$

$y = -2(x+5)(x-3)(x-6)$

$y = 2(x-1.5)^2 + 13.5$

Review: I can complete the square:

$Y = x^2 + 8x - 16$

$(x^2 + 8x + 16) - 16 - 16$

$y = (x+4)^2 - 32$

$x = -4 \pm \sqrt{32}$

$y = 2x^2 - 6x + 18$

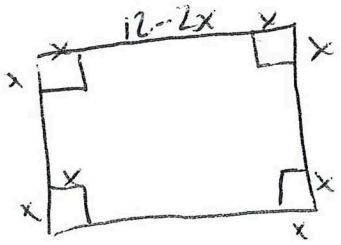
$2[x^2 - 3x + 9]$

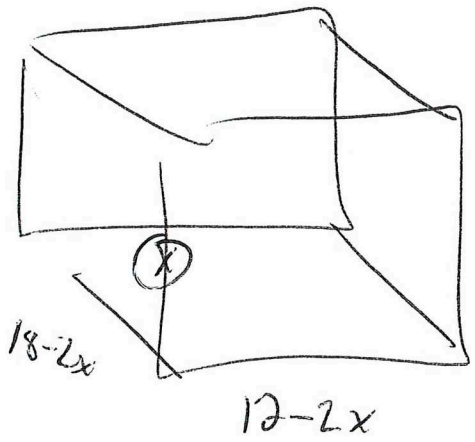
$2[(x^2 - 3x + 2.25) - 2.25 + 9]$

$2[(x-1.5)^2 + 6.75]$

Review: Equation of Volume of Box given 12 by 18 piece of paper:

What is the equation to represent this volume of an open top box?





$V = x(18-2x)(12-2x)$

$216 - 36x - 24x + 4x^2$

$x(4x^2 - 60x + 216)$

$4x^3 - 60x^2 + 216x$

Derivative $12x^2 - 120x + 216 = 0$

2.4 / 7.6 per Quadratic formula

So Best height is 2.4

2.4 by 13.2 by 7.2

Now do the short cut only. Given a 9 by 8 piece of paper,

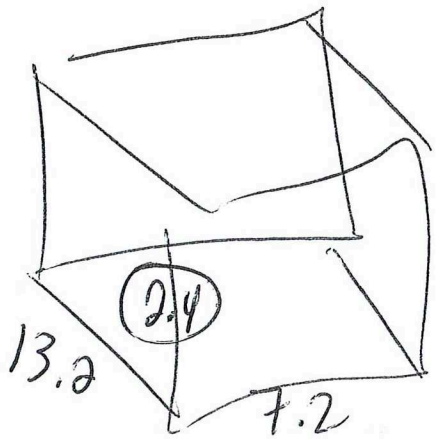
Write the equation for the open top box

Multiply it out into standard form

Find the derivative

Use the quadratic formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

What is the x that produces the max volume? What is the max volume?



Assignment #14

① $x^2 - 7x + 12$

$x+2 \overline{)\, x^3 - 5x^2 - 2x + 24}$

$-x^2 + 2x^2$

$-7x^2 - 2x$

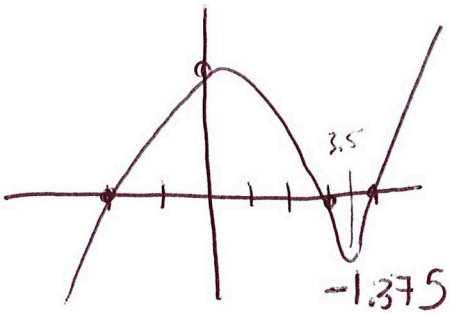
$+7x^2 + 14x$

$12x + 24$

$12x + 24$

$(x+2)(x^2 - 7x + 12)$

$\boxed{(x+2)(x-4)(x-3)}$



-1.375 Local Minimum $(3.5, -1.375)$

② $x^2 + 3x + 2$

$x-6 \overline{)\, x^3 - 3x^2 - 16x - 12}$

$-x^3 + 6x^2$

$3x^2 - 16x$

$-3x^2 + 18x$

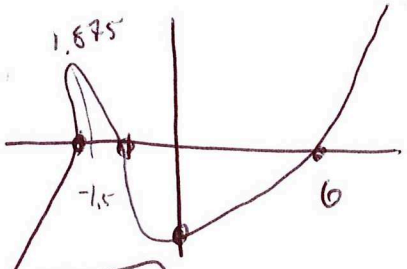
$2x - 12$

$-2x + 12$

0

$(x-6)(x^2 + 3x + 2)$

$\boxed{(x-6)(x+2)(x+1)}$



$\boxed{\text{Local MAX } (-1.5,\ 1.875)}$

(3)

$$x+5 \;\overline{)\; x^3 - x^2 - 21x + 45}$$

$x^2 - 6x + 9$

$-x^3 + 5x^2$

$-6x^2 - 21x$

$+6x^2 + 30x$

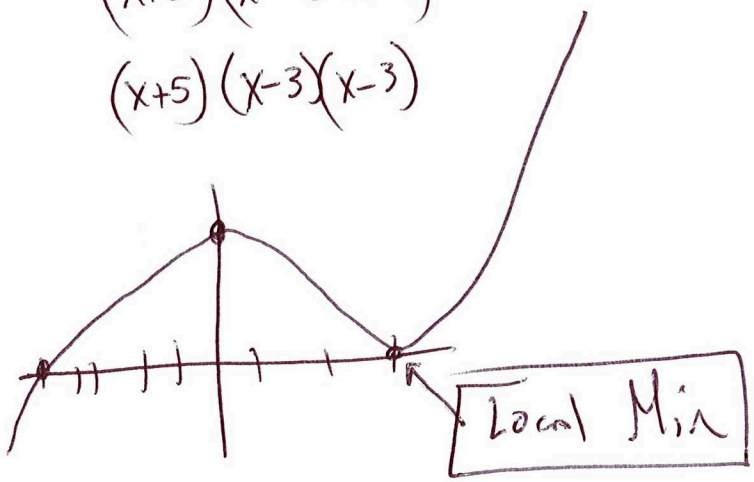
$9x + 45$

$-9x + 45$

0

$(x+5)(x^2-6x+9)$

$(x+5)(x-3)(x-3)$



(4)

$$x-9 \;\overline{)\; x^3 - 18x^2 + 95x - 126}$$

$x^2 - 9x + 14$

$-x^3 + 9x^2$

$-9x^2 + 95x$

$+9x^2 + 81x$

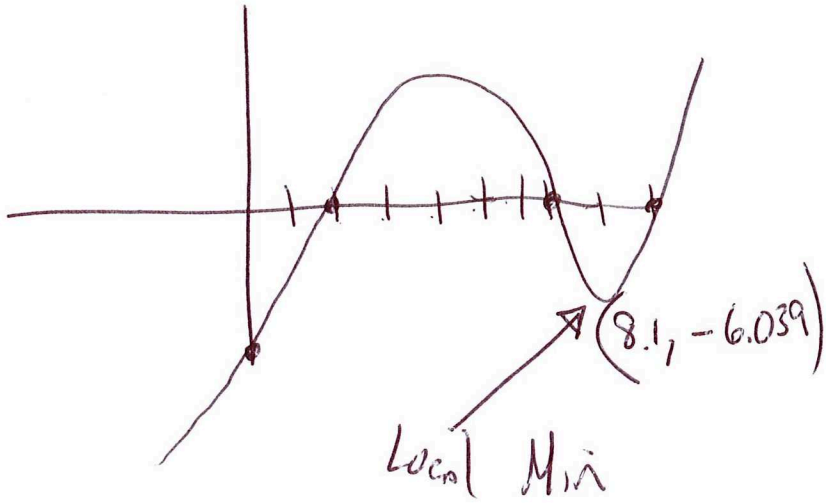
$14x - 126$

$-14x + 126$

0

$(x-9)(x^2-9x+14)$

$(x-9)(x-7)(x-2)$



(5) $(x+5)\overline{)x^3 - x^2 - 21x + 45}$

$x^2 - 6x + 9$

$-x^3 + 5x^2$

$-6x^2 - 21x$

$+6x^2 + 30x$

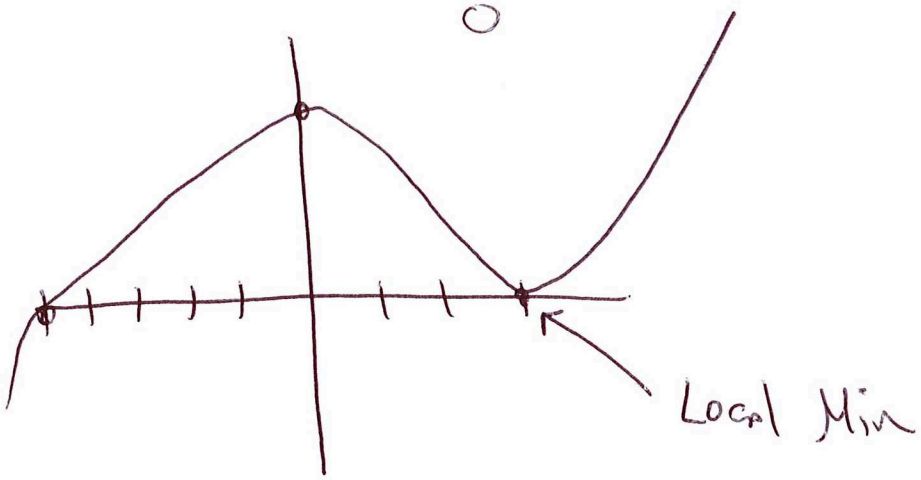
$9x + 45$

$-9x + 45$

0

$(x+5)(x^2 - 6x + 9)$

$(x+5)(x-3)(x-3)$



(6) $x-8\overline{)x^3 - 11x^2 + 14x + 80}$

$x^2 - 3x - 10$

$-x^3 + 8x^2$

$-3x^2 + 14x$

$-3x^2 + 24x$

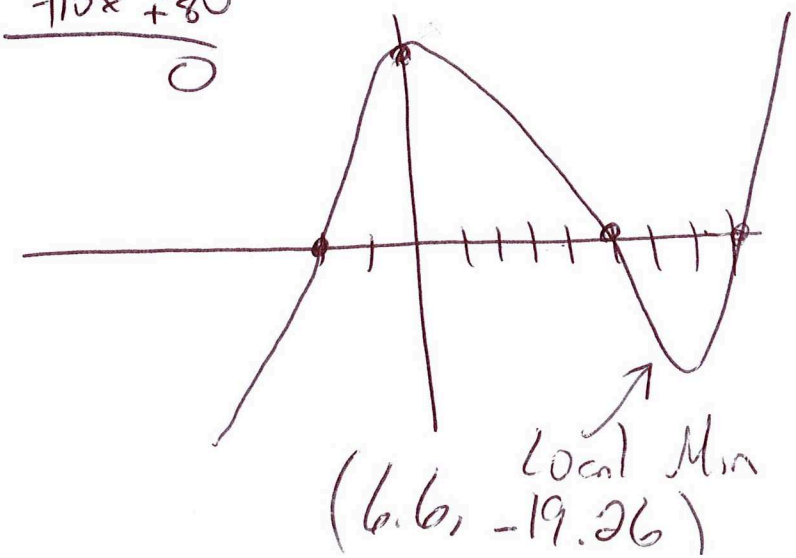
$-10x + 80$

$-10x + 80$

0

$(x-8)(x^2 - 3x - 10)$

$(x-8)(x-5)(x+2)$



(7)

$$x-1 \overline{)\,4x^3-4x^2-9x+9}$$

$4x^2-9$

$-4x^3+4x^2$ ↓

0

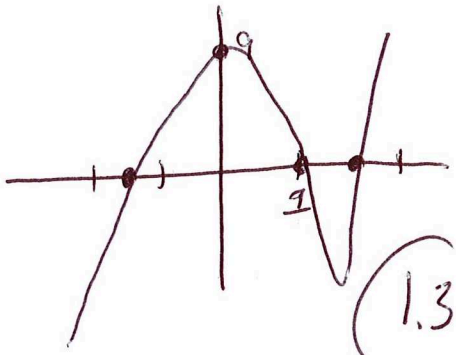
$-9x+9$

$+9x+9$

0

$(x-1)(4x^2-9)$

$(x-1)(2x-3)(2x+3)$



Local Min

$-.672$

$1.3, \cancel{.67}$

(8)

$$x+6 \overline{)\,2x^3+7x^2-33x-18}$$

$2x^2-5x-3$

$-2x^3+12x^2$

$-5x^2-33x$

$+5x^2+30x$

$-3x-18$

$+3x+18$

0

$(x+6)(2x^2-5x-3)$

(9)

$$x-4 \overline{)\, x^3 - 8x^2 + 4x + 48}$$

$x^2 - 4x - 12$

$-x^3 + 4x^2$ ↓

$-4x^2 + 4x$ ↓

$+4x^2 + 16x$

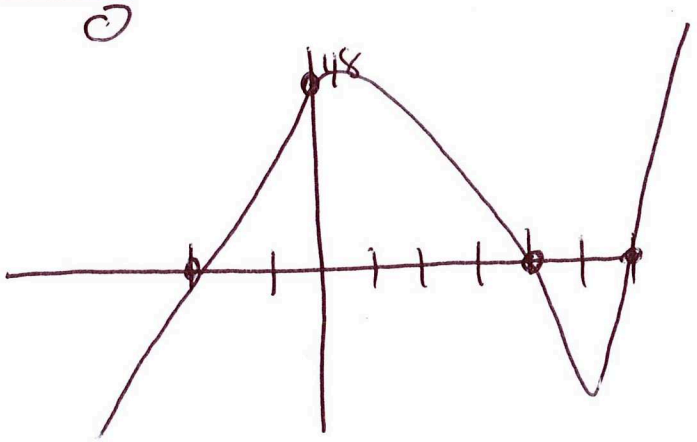
$-12x + 48$

$+12x + 48$

0

$(x-4)(x^2-4x-12)$

$\boxed{(x-4)(x-6)(x+2)}$



(10)

$$x-10 \overline{)\, 2x^3 - 14x^2 - 56x - 40}$$

$2x^2 + 6x + 4$

$-2x^3 + 20x^2$ ↓

$6x^2 - 56x$

$-6x^2 + 60x$

$4x - 40$

$-4x + 40$

0

$(x-10)(2x^2+6x+4)$

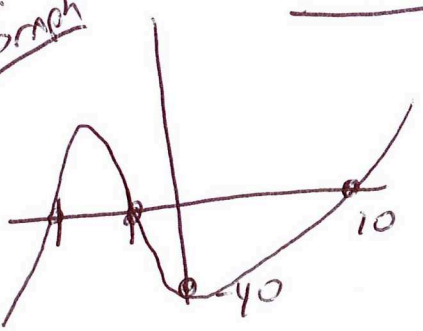
$4 \times 2 = 8$, $4 + 2 = 6$

	1x	2
2x	$2x^2$	4x
2	2x	4

$(x-10)(2x+2)(x+2)$

Roots: 10, -1, -2

Graph



(N)

$$3x-2 \overline{)\,6x^3+8x^2+x-6}$$

$2x^2+4x+3$

$-6x^3+4x^2$ ↓

$12x^2+x$

$-12x^2+8x$

$9x-6$

$-9x+6$

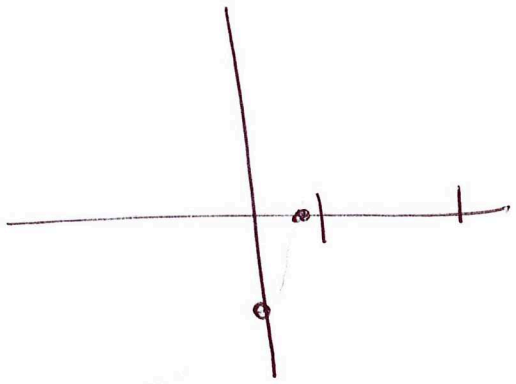
0

$(3x-2)(2x^2+4x+3)$

↓

no Real Roots

$16-4(2)(3) = -8$



(K)

$$x+5 \overline{)\,3x^3+22x^2+38x+15}$$

$3x^2+7x+3$

$-3x^3+15x^2$

$7x^2+38x$

$-7x^2+35x$

$3x+15$

$-3x+15$

0

$(x+5)(3x^2+7x+3)$

$49-4(3)(3) = 13$

$49-36$

$\frac{-7\pm\sqrt{13}}{6}$