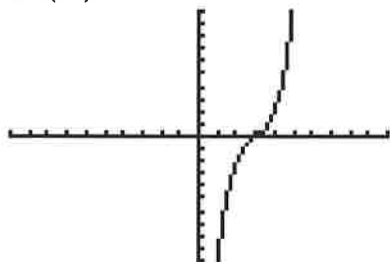


## Honors Math 3 Unit 2 Review

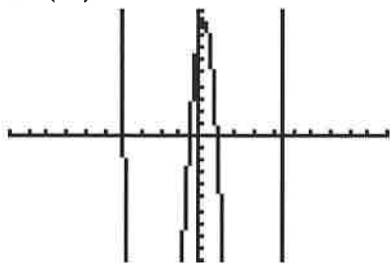
- Simplify:**  $(2x^3 - 6x + 4) - (3x^4 - 2x^3 + 4x^2 + 1) + (x^3 - 9x^2 + 8)$
- Simplify:**  $(2x - 1)(x + 3)^2$
- Factor:**  $3x^3 + 12x^2 - 3x - 12$
- Solve:**  $16x^3 + 54 = 0$
- Solve:**  $x^4 - 9x^2 + 20 = 0$
- Divide using long division:**  $(5x^4 + 14x^3 + 9x^2 + 38x + 1) \div (x^2 + 3x)$
- Divide using synthetic division:**  $(2x^4 - 3x^2 + 4) \div (x - 1)$
- Write the polynomial function given the following zeros: 0, -2, 3/5**
- List the number of zeros, the number of real zeros, and then list all zeros:**  
 $f(x) = x^3 - 9x^2 + 28x - 30$



X	Y1
0	-30
1	-10
2	-2
3	0
4	2
5	10
6	30

X=3

- List the number of zeros, the number of real zeros, and then list all zeros:**  
 $f(x) = x^4 - x^3 - 18x^2 + 10x + 8$



X	Y1
-5	258
-4	0
-3	-76
-2	-60
-1	-18
0	8
1	0

X=1

- A shipping company wants to make an open box from a sheet of cardboard 12 in by 15 in. Write a function for the volume of the box. Find the max volume of the box and the length of the side cut-outs for max volume.
- A rectangular patio is 12 feet by 14 feet. The homeowner wants to increase the area by 30 sq ft. Find the equation that could be used to find what value of "x" could be added to each dimension to get the new area.
- Write polynomial function in factored form with roots at  $x = -4$  with multiplicity of 2,  $x = 2$  with multiplicity 3 and  $x = 0$  with multiplicity 1.

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14. In  $f(x) = -x^3(x-2)(x+1)^2$ , a. Describe the end behavior, b. the roots and multiplicity

15. Solve:  $\frac{2}{3}|x-1| - 1 > 5$

16. Use the remainder theorem to find the remainder when  $\frac{1}{3}x^2 + 4x^3 - 2x + \frac{2}{3}$  is divided by  $x-2$ .

17. Is  $x-1$  a factor of the polynomial  $x^3 + x^2 - 2 = 0$ ? If so, solve to find all the roots.

18. Find the discriminant of  $3x^2 - 2x = 5$  and completely describe the roots.

19. Classify each polynomial by degree and by number of terms. Simplify first if necessary.

A.  $2x(x-3) - x(x+7)$

B.  $(-8x^3 - 2x + 5) - (-x^3 - 6)$

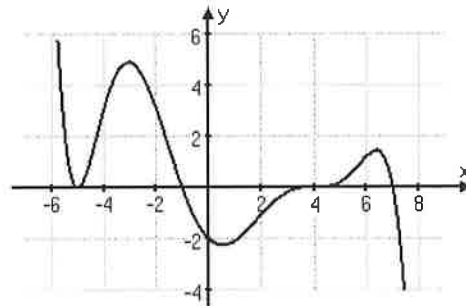
20. For the function  $f(x) = -x^2(x-2)$  A. describe the end behavior

B. determine x intercepts

21. Write a polynomial function in factored form with roots at  $x = -3$  with multiplicity 4,  $x = -2$  with multiplicity 3 and  $x = 0$  with multiplicity 1.

22. Is  $x+2$  a factor of the polynomial  $2x^4 + 6x^3 + 5x - 6$ ? If so what are the other factors? If not, why?

23. Write the polynomial of the given graph  $f(x)$ , including the correct multiplicities and leading coefficient.



**Be sure to study placemat for this unit, quizzes, notes and homework!!**

$$\textcircled{1} (2x^3 - 6x + 4) - (3x^4 - 2x^3 + 4x^2 + 1) + (x^3 - 9x^2 + 8)$$

$$\underline{2x^3} - 6x + 4 - \underline{3x^4} + \underline{2x^3} - 4x^2 + 1 + \underline{x^3} - 9x^2 + 8$$

$$-3x^4 + 5x^3 - 13x^2 - 6x + 11$$

$$\textcircled{2} (2x-1)(x+3)^2$$

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

$$(2x-1)(x^2+6x+9)$$

$$\begin{array}{r} \times \\ x+3 \\ \hline x^2+3x \\ +3 \\ \hline 3x+9 \end{array}$$

$$2x^3 + 11x^2 + 12x - 9$$

$$\begin{array}{r} 2x \\ -1 \\ \hline x^2+6x+9 \\ \hline 2x^3+12x^2+18x \\ -x^2-6x-9 \\ \hline \end{array}$$

$$\textcircled{3} 3x^3 + 12x^2 - 3x - 12$$

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

$$3(x^2(x+4) - 1(x+4))$$

$$3(x^2 - 1)(x+4)$$

$$3(x+1)(x-1)(x+4)$$

4

$$16x^3 + 54 = 0$$

$$2(8x^3 + 27) = 0$$

$\downarrow$                    $\downarrow$   
 $2x$                    $3$

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

$$2(2x+3)(4x^2 - 6x + 9) = 0$$

~~2=0~~

$$2x+3=0$$

$$2x = -3$$
  
$$x = -\frac{3}{2}$$

$$4x^2 - 6x + 9 = 0$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(4)(9)}}{2(4)}$$

$$x = \frac{6 \pm \sqrt{36 - 144}}{8}$$

$$x = \frac{6 \pm \sqrt{-108}}{8}$$

$$x = \frac{6 \pm i\sqrt{108}}{8}$$

$$x = \frac{6 \pm 6i\sqrt{3}}{8}$$

$$x = \frac{3 \pm 3i\sqrt{3}}{4}$$

$\left\{ -\frac{3}{2}, \frac{3 \pm 3i\sqrt{3}}{4} \right\}$

108  
^  
36 3  
^  
6 6  
^   ^  
2 3 2 3 3  
3 3 3 2

$$\textcircled{5} \quad x^4 - 9x^2 + 20 = 0$$

$$(x^4 - 5x^2)(-4x^2 + 20) = 0$$

$$\begin{array}{r} 20 \\ -5 \times -4 \\ -9 \end{array}$$

$$x^2(x^2 - 5) - 4(x^2 - 5) = 0$$

$$(x^2 - 4)(x^2 - 5) = 0$$

$$x^2 - 4 = 0$$

$$\sqrt{x^2} = \sqrt{4}$$

$$x = \pm 2$$

$$x^2 - 5 = 0$$

$$\sqrt{x^2} = \sqrt{5}$$

$$x = \pm \sqrt{5}$$

$\textcircled{6}$

$$x^2 + 3x$$

$$5x^2 - 1x + 12 + \frac{2x+1}{x^2+3x}$$

$$\begin{array}{r} 5x^4 + 14x^3 + 9x^2 + 38x + 1 \\ -5x^4 + 15x^3 \\ \hline \end{array}$$

$$\begin{array}{r} -1x^3 + 9x^2 + 38x + 1 \\ +1x^3 + 3x^2 \\ \hline \end{array}$$

$$\begin{array}{r} 12x^2 + 38x + 1 \\ -12x^2 + 36x \\ \hline \end{array}$$

$$\underline{\underline{2x+1}}$$

⑦  $(2x^4 - 3x^2 + 4) \div (x-1)$

$$\begin{array}{r} 1 \overline{) 2 \ 0 \ -3 \ 0 \ 4} \\ \underline{2 \ 2 \ -1 \ -1} \phantom{0} \\ 2 \ 2 \ -1 \ -1 \ 3 \end{array}$$

$2x^3 + 2x^2 - x - 1 + \frac{3}{x-1}$

⑧

$x=0 \quad x=-2 \quad x=\frac{3}{5}$   
 $\downarrow$   
 $x=0 \quad x+2=0 \quad 5x=3$   
 $5x-3=0$

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

⑨

3 zeros

$\{3, 3 \pm i\}$

$$\begin{array}{r} 3 \overline{) 1 \ 9 \ 28 \ -30} \\ \underline{3 \ -18 \ 30} \\ 1 \ -6 \ 10 \ 0 \end{array}$$

$\square = \left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$   
 $\sqrt{(x-3)^2 - 9} = \sqrt{-1}$   
 $x-3 = \pm i$   
 $x = 3 \pm i$

$x^2 - 6x + 10 = 0$   
 $x^2 - 6x + 9 = -10 + 9$   
 $(x-3)^2 = -1$

10 4 zeros

$$\begin{array}{r} \sum -4, 1, 2 \pm \sqrt{6} \quad \left. \begin{array}{l} -4 \\ \downarrow \end{array} \right\} \begin{array}{r} 1 \quad -1 \quad -18 \quad 10 \quad 8 \\ \downarrow -4 \quad 20 \quad -8 \quad -8 \\ \hline 1 \quad -5 \quad 2 \quad 2 \quad 0 \end{array} \end{array}$$

$$\begin{array}{r} \downarrow \quad \downarrow \quad \downarrow \\ 1 \quad -5 \quad 2 \quad 2 \\ \hline 1 \quad -4 \quad -2 \quad 0 \end{array}$$

$$\begin{array}{l} \left(\frac{-4}{2}\right)^2 \\ (-2)^2 \\ 4 \end{array}$$

$$x^2 - 4x - 2 = 0$$

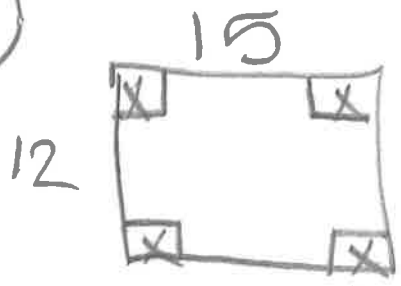
$$x^2 - 4x + \boxed{4} = 2 + \boxed{4}$$

$$\sqrt{(x-2)^2} = \sqrt{6}$$

$$x-2 = \pm\sqrt{6}$$

$$x = 2 \pm \sqrt{6}$$

11

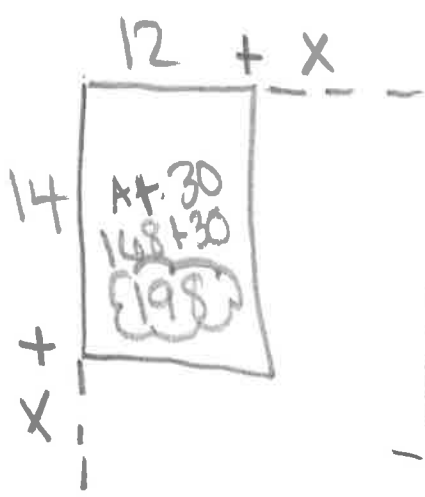


$$V = l \cdot w \cdot h$$

$$V = (12 - 2x)(15 - 2x)x$$

Max: 177.23 in<sup>3</sup>  
 volume  
 Length: 2.21 in

12



$$A = l \cdot w$$

$$198 = (12 + x)(14 + x)$$

$$198 = x^2 + 26x + 168$$

$$-198 \quad -198$$

$$x^2 + 26x - 30 = 0$$

13

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



⑭  $f(x) = -x^3(x-2)(x+1)^2$

a) Degree - 6  
Lead coeff - Negs

Fall, Fall

b)  $x=0$   
 $m: 3$

$x=2$   
 $m: 1$

$x=-1$   
 $m: 2$

⑮  $\frac{2}{3} |x-1| - 1 > 5$

$\frac{2}{3} |x-1| > \frac{6}{2/3}$        $6 \cdot \frac{3}{2}$

$|x-1| > 9$

$x-1 > 9$  or  $x-1 < -9$

$x > 10$  or  $x < -8$



$$\textcircled{16} \quad \frac{1}{3}x^2 + 4x^3 - 2x + \frac{2}{3} \div x - 2$$

$$\frac{1}{3}(2)^2 + 4(2)^3 - 2(2) + \frac{2}{3} \quad x=2$$

Remainder: 30

$$\textcircled{17} \quad x^3 + x^2 - 2 = 0 \quad x-1$$

$$(1)^3 + (1)^2 - 2 = 0 \quad x=1$$

$$0 = 0$$

$$\begin{array}{r|rrrr} 1 & 1 & 0 & -2 & \\ & \downarrow & & & \\ & 1 & 2 & 2 & 0 \end{array}$$

$$x^2 + 2x + 2 = 0$$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(2)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - 8}}{2}$$

$$x = \frac{-2 \pm \sqrt{-4}}{2}$$

$$x = \frac{-2 \pm 2i}{2} \rightarrow x = -1 \pm i$$

1, -1 ± i

18

$$3x^2 - 2x = 5$$

$$3x^2 - 2x - 5 = 0$$

$$b^2 - 4ac$$
$$(-2)^2 - 4(3)(-5)$$

$$4 + 60$$

64 2 Real Rational

19

A.  $2x(x-3) - x(x+7)$

$$2x^2 - 6x - x^2 - 7x$$

$x^2 - 13x$   
Quadratic  
Binomial

B.  $(-8x^3 - 2x + 5) - (x^3 - 6)$

$$-8x^3 - 2x + 5 + x^3 + 6$$

$-7x^3 - 2x + 11$   
Cubic Trinomial

20

$$f(x) = -x^2(x-2)$$

A: Degree  $\rightarrow 3$   
Lead coeff  $\rightarrow$  Neg

Rise Fall

a  
B.  $x=0$   $x=2$   
m: 1 m: 1

$$21) y = x(x+3)^4(x+2)^3$$

$$22) \begin{array}{r} -2 \mid \quad 2 \quad \quad 6 \quad \quad 0 \quad \quad 5 \quad \quad 5 \quad \quad -6 \\ \quad \quad \downarrow \quad -4 \quad \quad -4 \quad \quad 8 \quad \quad -26 \\ \hline \quad \quad 2 \quad \quad 2 \quad \quad -4 \quad \quad 13 \quad \quad -32 \end{array}$$

Not a factor because it had a remainder of 32

23)

$$y = -(x+3)^2(x+1)(x-4)^3(x-7)$$

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