Unit 1B Review

For the functions below:

- Determine/state the excluded values and domain of the function
- Determine/state the location of any vertical, horizontal or slant asymptotes
- Determine/state the coordinates of any holes
- Determine/state the coordinates of any x intercepts
- **If any of the above does not exist on the graph, please say so**

1) $f(x) = \dfrac{x^3 - 4x}{x^2 - 3x - 10}$

$\dfrac{x(x+2)(x-2)}{(x+2)(x-5)}$

Domain: $\mathbb{R}$ except $-2, 5$

VA $x=5$

HA none

SA $y=x+3$

hole $(-2, -8/7)$

x int $(0,0)$ $(2,0)$

y int $(0,0)$

2) $f(x) = \dfrac{4x^2 - 13x + 3}{x^2 + 8x - 33}$

$\dfrac{(4x-1)(x-3)}{(x+11)(x-3)}$

Domain: $\mathbb{R}$ except $-11, 3$

VA: $x=-11$

HA: $y=4$

SA: None

hole: $\left(3, \frac{-13}{8}\right)$

x intercept $\left(\frac{1}{4}, 0\right)$

y intercept $\left(0, \frac{-1}{11}\right)$

Unit 1B Review

Solve the following equations, **Please note any extraneous solutions**

1) $1 = \frac{n-2}{n-1} + \frac{3}{n^2+3n-4}$

$n = -1$

2) $1 = \frac{2}{r^2} - \frac{1}{r}$

$r = -2, 1$

Solve the following inequalities, quantify your answer in interval notation

3) $(x + 4)^2(x - 1)^2(x - 6) < 0$

$(-\infty, -4) \cup (-4, 1) \cup (1, 6)$

4) $4m^3 + 7m^2 - 2m > 0$

$(-2, 0) \cup (\frac{1}{4}, \infty)$

5) $\frac{4}{x-1} \geq \frac{3}{x-7}$

$(1, 7) \cup [25, \infty)$

6) $\frac{3}{x-2} \leq \frac{3}{x+3}$

$(-3, 2)$

Unit 1B Review

Simplify the following:

25) $(-3+3i)^2$

$-18i$

26) $(-3+6i)(5-6i)$

$21+48i$

29) $(3i)(-3-4i)(7-5i)$

$39-123i$

30) $(-7i)(-2+7i)(2+6i)$

$14-322i$

39) $\frac{-7+i}{-6-8i}$

$\frac{17-31i}{50}$

40) $\frac{-2+i}{-1-8i}$

$\frac{-6-17i}{65}$

37) $\frac{8}{-4-2i}$

$\frac{-8+4i}{5}$

38) $\frac{6i}{9-9i}$

Solve the following for all real/complex solutions

1) $x^4-5x^2-36=0$

$x=3,-3,2i,-2i$

2) $x^3+3x^2-14x-20=0$

$x=-5,\ 1\pm\sqrt{5}$

5) $x^4+6x^2+8=0$

$x=\pm 2i,\pm i\sqrt{2}$

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

$x=2,\pm\sqrt{3}$

Unit 1B Review

Write the equation of the polynomial that has the following zeros:

a. -3 mult. 2, $2\sqrt{2}$

$x^4+6x^3+7x^2-12x-18$

b. $-3+2i$, $-2-2i$

$x^4+10x^3+45x^2+100x+104$

Use the zero(s) given to determine all other zeros to the polynomial equation:

a. $f(x) = x^4 - 3x^3 + 6x^2 + 2x - 60$; $1 + 3i$

$x = 1 \pm 3i, -2, 3$

b. $g(x) = x^3 - 7x^2 - x + 87$ $5 + 2i$

$x = 5 \pm 2i, -3$

Unit 1B Review

- What is the difference between a ~~real~~ imaginary and a complex number. Give an example of each

  Imaginary number is a representation of $\sqrt{-1}$ by letter $i \rightarrow$ real number is composed of real + imaginary parts. Standard form is $a+bi$ where a and b are real

- What is the relationship between the domain of a rational function and its discontinuities? What are the two types of discontinuities that can be present on a rational function graph?

  the domain of a function is $\mathbb{R}$ except where there are discontinuities. the two types of discontinuities are Vertical Asymptotes and holes

- What is an extraneous solution? What types of functions have extraneous solutions and why? Describe how you can check for extraneous solutions

  extraneous solutions occur in situations where the solution can not exist. examples of functions that have extraneous solutions are
  - Rational - b/c you can't divide by zero
  - Sq root - b/c you can't take a sq root of a negative
  - Av - b/c Av can't be negative

  check by plugging in answer to original equation. if the pictures above are a result the solution is extraneous

- Describe how to find the location of a Horizontal Asymptote of a rational function

(M) Compare degree of numerator to degree of denominator

1. if Deg of numerator > degree of denominator then there is no HA
2. if Deg of numerator < degree of denominator then HA is $y=0$
3. if Deg of numerator = degree of denominator then HA = $\frac{\text{LC of numerator}}{\text{LC of denominator}}$

Factor each to linear factors. One zero has been given.

19) $f(x) = 5x^5 + 49x^4 + 125x^3 + 113x^2 + 22x - 10;\ -4 + \sqrt{6}$

$(x+4+\sqrt{6})(x+4-\sqrt{6})(x+1)^2(5x-1)$

Unit 1B Review

Solve the following AV equations, identify any extraneous solutions

a. $-3|x-1|-6=3$

$-3|x-1|=3$

$|x-1|=-1$

No Solution

b. $\frac{1}{4}|2x-6|+1=2$

$\frac{1}{4}|2x-6|=1$

$|2x-6|=4$

$2x-6=4$ or $2x-6=-4$

$2x=10$ $\quad$ $2x=2$

$x=5$ $\quad$ $x=1$

c. $|2x+3|=3x+2$

$2x+3=3x+2$ or $2x+3=-3x-2$

$x=1$ $\quad$ $5x=-5$

$x=-1$

↓ extraneous

d. $-5|3+4k|=-115$

$|3+4k|=23$

$3+4x=23$ or $3+4x=-23$

$4x=20$ $\quad$ $4x=-26$

$x=5$ $\quad$ $x=\frac{-13}{2}$

Solve the following AV inequalities and graph the solution on a number line.

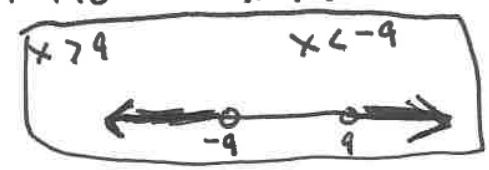
a. $2|x-9|+6>6$

$2|x-9|>0$

$|x-9|>0$

$x-9>0$ $\quad$ $x-9<0$

$x>9$ $\quad$ $x<-9$



b. $3\left|\frac{1}{2}x+2\right|+6<15$

$3\left|\frac{1}{2}x+2\right|\leq 9$

$\left|\frac{1}{2}x+2\right|<3$

$\frac{1}{2}x+2<3$ or $\frac{1}{2}x+2>-3$

$\frac{1}{2}x<1$ $\quad$ $\frac{1}{2}x>-5$

$x<2$ $\quad$ $x>\frac{-5}{2}$

c. $-4|3x-1|\geq 8$

$|3x-1|\geq -2$

↓

All Real Numbers

d. $\frac{|2+3x|}{2}\geq 5$

$|2+3x|\geq 10$

$2+3x\geq 10$ or $2+3x\leq -10$

$3x\geq 8$ $\quad$ $3x\leq -12$

$x\geq \frac{8}{3}$ $\quad$ $x\leq -4$