MRWC – Fall Final Exam Review 2019 Name_____Per_____

Determine if the following statements are True or False:

1. _____ 5 is a complex number.

2. _____ 12 is a composite number.

3. _____ 4 is both a natural number and an integer.

4. _____ -5 is both a whole number and an integer.

5. _____ π is a real number

6. _____ *e* is not rational.

7. _____ 6*i* is a real number

8. _____ $\frac{2}{3}$ is a complex number

9. _____ 7.82 is a rational number.

10. _____ 0 is a positive number.

11. A Rational Number is an Integer.

A. Always **B.** Sometimes **C.** Never

12. An Integer is a Natural Number.

A. Always **B.** Sometimes **C.** Never

13. A Natural Number is Rational Number.

A. Always **B.** Sometimes **C.** Never

14. An Integer is a Whole Number.

A. Always **B.** Sometimes **C.** Never

15. A number can be both rational and irrational.

A. Always **B.** Sometimes **C.** Never

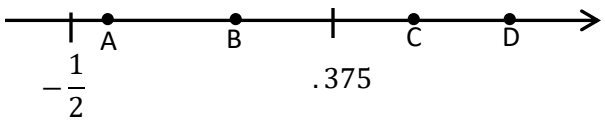
16. Give the definition of a rational number:

17. What is the approximate value of e?

What is the approximate value of π?

18. State five irrational numbers:

19. Which point represents the best approximation of zero?



20. Evaluate.

a) $log_7\left(\frac{1}{7}\right)$ b) $log 1000$ c) $5log_4 64$ d) $log_{121} 11$

e) $log_{27} 81$ f) $log_3 1$ g) $log_{81}\left(\frac{1}{9}\right)$ h) $log_{\frac{1}{25}} 5$

i) $log_{\frac{1}{2}} 8$ j) $log_{64} 4$ k) $log_5\left(\frac{1}{125}\right)$ l) $log_8 4$

21. Simplify:

A. $(3\sqrt{3}+2\sqrt{5})(3\sqrt{3}-2\sqrt{5})$ B. $\sqrt{45}-2\sqrt{20}+\sqrt{80}$ C. $\left(\pi-\sqrt{e}\right)^2$

22. Rationalize the denominator.

A. $\frac{3}{\sqrt{5}-2}$ B. $\frac{\sqrt{5}}{2-\sqrt{6}}$

23. Expand the logarithm completely

A. $\log_3 \frac{x^2y^3}{z^5}$ B. $\log_4 4x^2$

24. Condense the logarithm completely:

A. $3\log a + \log b - 2\log c$ B. $\frac{1}{2}\log 9 - 2\log 4$

25. Simplify if necessary and determine what set ($Natural$ ($\mathbb{N}$), $Integers$ ($\mathbb{Z}$), $Rational$ ($\mathbb{Q}$), $Real$ ($\mathbb{R}$)) the number belongs under:

A. $\frac{\sqrt{4}}{\sqrt{16}}$ B. 52% C. $0.\overline{37}$ D. $\log_3 \frac{1}{3}$ E. $\sqrt{12}$

26. Is the following statement ALWAYS, SOMETIMES, or NEVER true? Justify.

A. The product of two numbers is larger than each one of the numbers.

B. The square root of a number is smaller than the number.

C. The sum of two numbers is larger than each one of the numbers.

D. The quotient of two numbers is smaller than each one of the numbers.

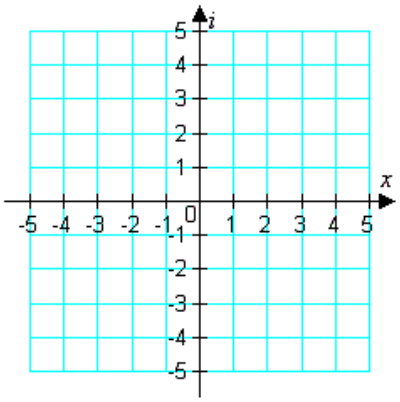
27. Solve for x. Write the solution in Cartesian Form if it is a complex number.

a. $x^2+4x+7=0$ b. $2x^2-x+5=0$

28. Express the following numbers in standard Cartesian form $(a + bi)$.

A. $(3 + 2i)^2$ B. $\frac{4}{1-2i}$ C $(-1 + 5i) - (5 - 3i)$ D. $(2 + 3i)(3 - 5i)$

29. Graph the following points on the complex plane



A. $2 + 3i$

B. $2 - 3i$

C. The conjugate of $1 + 2i$

30. What is the modulus (r) of each ***point*** in question 26?

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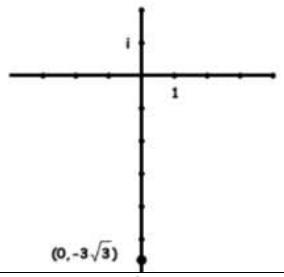
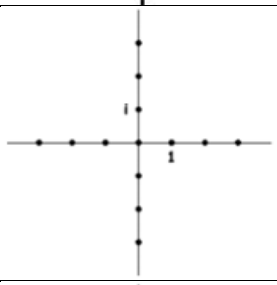
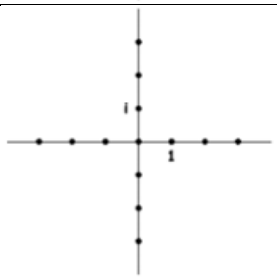
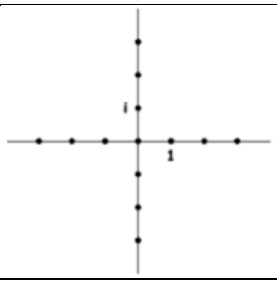
A. r = B. r = C. r =

31. Complete the table by filling in the missing forms for each given complex number.

Cartesian Form	Argand Form	Polar Form	Trigonometric Form
			
		$r = 1$ $\theta = 30°$	
			$2(\cos 210° + i \sin 210°)$
$-1 - i$			

32. Create a mapping diagram of the following scenarios

A. Many to one

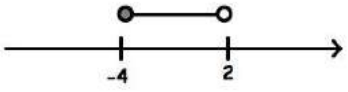
B. A person to their Social Security Number

33. Express the following statement in interval notation:

A. $2 \leq x < 6$

B. $x \geq -2$

34. Write interval notation for the following graph:



35. Using the following piecewise function $f(x) = \begin{cases} x^3, & x \leq 0 \\ 4, & 0 < x < 3 \\ 2x + 3, & x \geq 3 \end{cases}$

Find: $f(3) =$ $f(1) =$ $f(-2) =$

36. Find the Domain of the following functions:

a. $f(x) = x^2 - 3x - 18$

b. $y = \frac{x+1}{x^2-9}$

c. $f(x) = 3^x + 1$

d. $f(x) = \sqrt{x-6}$

e. $y = log(x+5) - 2$

f. $f(x) = \sin(x-3)$

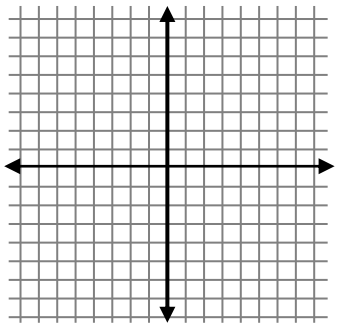
37. Find the all of the solutions/zeros/roots.

$f(x) = x^3 + 3x^2 - x - 3 = 0$

38. How many roots does the polynomial have?

$y = -6x^5 + 3x - 8$

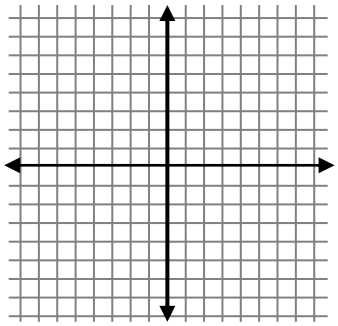
39. Sketch the graph of $f(x) = -(x-4)(x+1)^2$



x-int: _____ y-int: _____

End Behavior: _____ Sign Chart: _____

40. Sketch a graph of $f(x) = x^3 - 7x^2 - 18x$.



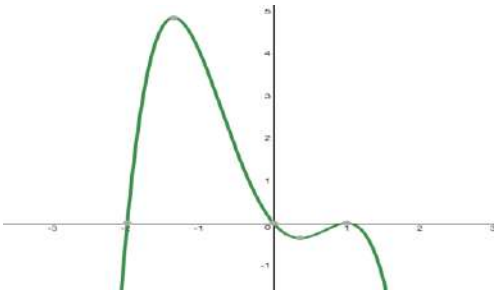
x-int: _____ y-int: _____

End Behavior: _____ Sign Chart: _____

41. State the zeros of the function and tell whether they result in a "cross" or "bounce/touch":

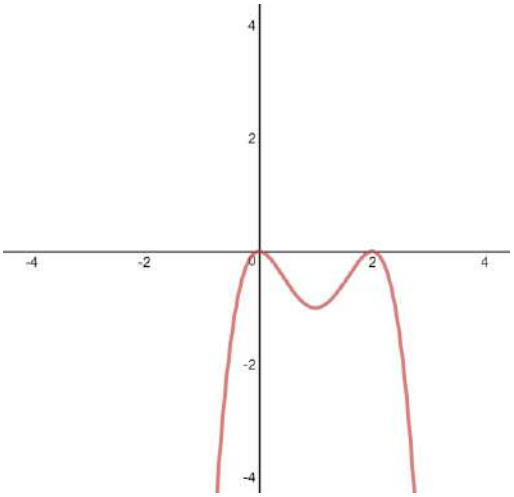
$$f(x) = (x-2)^5(x+2)^3(x-4)^2$$

42. Using the zeros of the function and end behavior, write a possible equation for the following function



Possible Equation:_____

43. List all characteristics of the following graph of a function:



Domain		Negative Intervals	
Range		Increasing Intervals	
Asymptotes or Holes		Decreasing Intervals	
Zeros		Relative Maximum	
End Behavior		Relative Minimum	
Positive Intervals		~~Even, Odd, Neither~~	

44. State the domain of the function and identify the vertical asymptotes or holes in each function:

a. $y = \frac{x}{x^2-9}$

b. $y = \frac{x^2-4}{x+2}$

45. Given: $f(x) = \frac{1}{x-2}$.

A. What is the domain of the function?

B. What is the vertical asymptote of the function?

C. What is the end behavior of the function?

46. Find the zeros of the function: $y = \frac{x^2+7x+10}{x+3}$

47. Find the holes in the function: $y = \frac{x^2+8x+7}{x+1}$

48. Find the vertical and horizontal asymptotes of the function: $y = \frac{3x-12}{x^2-x-12}$

49. Sketch each rational function graph.

a. $y = \frac{x}{x^2-4}$

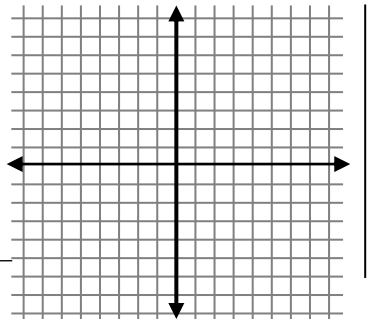
VA: _____

HA: _____

x-int: _____

y-int: _____

End Behavior:



Behavior around the V.A.

b. $y = \frac{x+2}{x-3}$

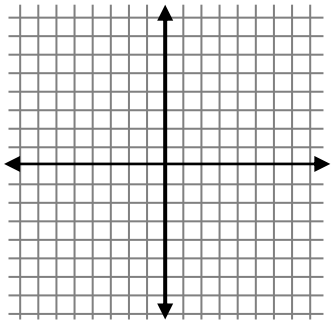
VA: _____

HA: _____

x-int: _____

y-int: _____

End Behavior:



Behavior around the V.A.