Name:_____ Teacher:_____ Period_____

EVHS **Math Analysis** **Semester 1 Finals Review** **(15 points)**

Multiple Choice

Show all work neatly organized that leads to the solution in order to receive **FULL** credit. Be sure to check and circle your answers.

1 **Which of the following would NOT pass the Vertical Line Test showing that y is a function of *x*?**

A $8 = y^3 - 2x$

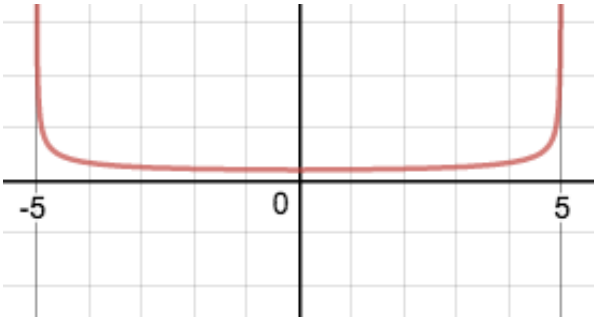
B $x^2 = 9 - y$

C $x = 3y^2 + 1$

D $y = -2|x| + 3$

2 **State the domain and range of:**

$$f(x) = \frac{1}{\sqrt{25-x^2}}$$



3 **How does $g(x)$ compare to the parent function $f(x)$?**

$$f(x) = x^5$$

$$g(x) = (x-3)^5 + 7$$

4 **What is $f(g(x))$ and $g(f(x))$ when $f(x) = 2 - 3x^2$, $g(x) = 3 - x$?**

5 **Find $\frac{f}{g}$ and state the domain.**

$f(x) = x + 5$, $g(x) = x^2 - x - 2$

6 **Which function listed below is "*one-to-one*"?**

A $y = 5 - |x|$

B $12 = y - 4x^3$

C $y = 3x^2 + 1$

D $x^2 + y^2 = 49$

7 **Find the end behavior for $f(x)$ using the Leading Coefficient Test.**

$$f(x) = 3(5x^3 - 10x^2 - x + 7)$$

A $f(x) \to -\infty,\ x \to -\infty;\ f(x) \to -\infty,\ x \to \infty$

B $f(x) \to -\infty,\ x \to -\infty;\ f(x) \to \infty,\ x \to \infty$

C $f(x) \to \infty,\ x \to -\infty;\ f(x) \to -\infty,\ x \to \infty$

D $f(x) \to \infty,\ x \to -\infty;\ f(x) \to \infty,\ x \to \infty$

8 **Divide $f(x)$ by $d(x)$.**

$f(x) = 5x^4 + 17x^3 + 7x^2 - 11 \qquad d(x) = x + 3$

A $\frac{f(x)}{d(x)} = 5x^3 + 2x^2 + x - 3 - \frac{x+3}{2}$

B $\frac{f(x)}{d(x)} = 5x^4 + 2x^3 + x^2 - 3x - \frac{2}{x+3}$

C $\frac{f(x)}{d(x)} = 5x^3 + 2x^2 + x - 3 - \frac{2}{x+3}$

D $\frac{f(x)}{d(x)} = 5x^3 + 2x^2 + x - 3 + \frac{2}{x+3}$

9 **Find a polynomial function that has the given zeros.**

zeros: $-5, -3,\ 3$

10 **Perform the operation and write the result in standard form $(a + bi)$.**

$$(3 + 5i) \cdot (-5 + 11i)$$

11 **Find ALL of the zeros of the function using the given function and one of its zeros.**

$f(x) = 2x^3 + 3x^2 + 50x + 75 \qquad Zero: -\frac{3}{2}$

12 **Simplify the complex number and write it in standard form.**

$$9i^6 - 2i^3 + 5i^8$$

A $-9 + 7i$

B $-4 + 2i$

C $-7 + 9i$

D $4 - 2i$

13 **Find a polynomial function f with real coefficients that has the given zeros.**

$$\boldsymbol{zeros}:\ -3, (2-i)$$

14 **Given $f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_2 x^2 + a_1 x^1 + a_0 x^0$ is a polynomial with real coefficients and $a_0 \neq 0$. Which of the following statements is <u>always true</u>?**

A $f(x)$ has **exactly** n real zeros.

B The graph of $f(x)$ has **at most** n turning points.

C $f(x)$ has **exactly** $(n-1)$ linear factors.

D The graph of $f(x)$ has **at most** $(n-1)$ turning points.

15 **Find any HOLES and ASYMPTOTES in the graph of the given rational function.**

$$f(x) = \frac{x^3 - 16x}{x^2 + 10x + 24}$$

16 **Find any HOLES and ASYMPTOTES in the graph of the given rational function.**

$$f(x) = \frac{x^2 + 7x + 12}{x^2 - 9}$$

A $Hole\ at\ x = -3, VA: x = 3, HA: y = 1$

B $Hole: x = -3, VA: x = -4, 0,\ HA: y = 0$

C $Hole: x = 3, VA: x = -3, , HA: y = 1$

D $Hole: none\ , VA: x = -3, HA: none$

17 **State the domain of the function:**

$$f(x) = \frac{2}{x^2 - 3x - 18}$$

A $(-\infty, -3) \cup (6, \infty)$

B $(-\infty, -3) \cup (-3, 6) \cup (6, \infty)$

C $(-\infty, -3] \cup (-3, 2) \cup [6, \infty)$

D $(-3, 2) \cup (2, 6)$

18 **Solve for x in the equation $27^x = 9^{4x-6}$**

19 **Using the half-angle formula find the EXACT value of** $\tan\frac{\pi}{8}$.

20 **Find the domain of the function:**

$f(x) = 7\log(4x + 1) - 2$.

21 **Rewrite the logarithmic function in its exponential form.**

$$\log_9 27 = \frac{3}{2}$$

22 **CONDENSE the expression using the properties of logarithms.**

$$f(x) = 3\ln x + \frac{1}{2}\ln y - 5\ln z$$

23 **Evaluate the logarithm WITHOUT a calculator.**

$$\frac{1}{2}\log_{11} 121 =$$

24 **EXPAND the expression using the properties of logarithms.**

$$f(x) = \ln\frac{x^2y^3}{z^4}$$

25 **What is the inverse of** $f(x) = -3x^3 + 15$**?**

26 **Solve for x.**

$$\log_2(x^2 - 1) - \log_2(x - 1) = 3$$

27 **Simplify $4e^{5\ln(3x-2)}$.**

28 **Find one Positive and one Negative coterminal angle of $\theta = 153°$.**

29 To find the height of the tree you can use the length of its shadow and the angle of elevation. **Find the height of the tree whose shadow is 4 feet long at an angle of elevation that is 60°.**

A $3\ ft$

B $5\sqrt{3}\ feet$

C $4\sqrt{3}\ feet$

D $4\ feet$

30 **Identify the period of the given trigonometric function.**

$$f(x) = -3\tan 4x + 3$$

31 **Find the reference angle θ' for the given angle θ.**

$$\theta = \frac{21\pi}{8}$$

32 $\cot\theta = -\frac{12}{5}$, θ **is in Quadrant IV**

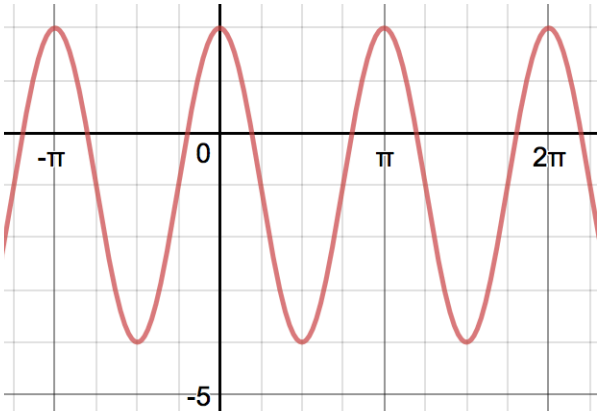
$$\sin\theta =$$

33 **Evaluate the function:**

$$\cot^2\frac{4\pi}{3} - \csc^2\frac{4\pi}{3} =$$

34 $\sin\frac{-13\pi}{4} =$

35 **Find the equation of the graph below.**



A $y = 3\sin(2x) - 1$

B $y = 6\cos\left(\frac{x}{2}\right) - 1$

C $y = 3\cos(2x) - 1$

D $y = 6\cos(4x) - 1$

36 **Using the power-reducing formula simplify the expression so that it is written in the first power of cosine functions.**

$$\sin^2 2x$$

37 **Using the product-to-sum formula rewrite the expression as a sum or a difference.**

$$6\cos 45° \sin 15°$$

38 **Use the sum and difference formulas to find the EXACT value of the expression.**

$$\sin\frac{\pi}{4}\cos\frac{\pi}{12} - \cos\frac{\pi}{4}\sin\frac{\pi}{12}$$

39 **Find all solutions in the interval $[0, 2\pi)$ algebraically.**

$$\csc^2 x - \cot x = 1$$

40 What is the **missing step** in the verification of the identity?

$$2 - \sin^2 x = 1 + \cos^2 x$$
$$\boxed{} =$$
$$2 - 1 + \cos^2 x =$$
$$1 + \cos^2 x = 1 + \cos^2 x$$

A $2 - 1 - \cos^2 x$

B $2 - (\cos^2 x - 1)$

C $2 - (1 - \cos^2 x)$

D $2 - (1 + \cos^2 x)$