

Teacher _____

Name _____

1. Solve the nonlinear inequality: $\frac{2x+6}{x-2} < 0$

- a. $(-\infty, -6) \cup (2, \infty)$ b. $(-\infty, -6)$ c. $(-6, 2)$ d. $(-\infty, -3) \cup (2, \infty)$ e. $(-3, 2)$

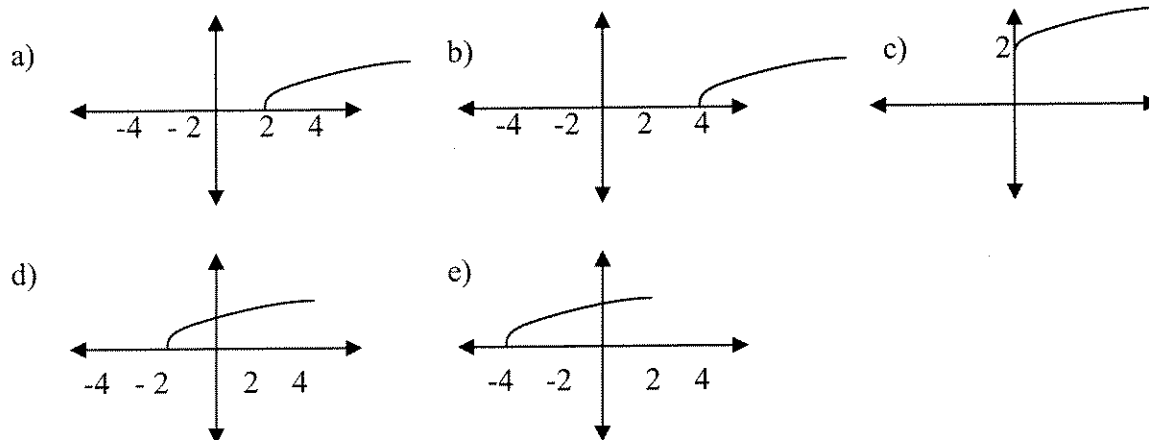
2. Find the distance between the two points $(-1, 3)$ and $(2, -5)$

- a. $\sqrt{5}$ b. $\sqrt{13}$ c. $\sqrt{17}$ d. $\sqrt{65}$ e. $\sqrt{73}$

3. Find the equation of the line that satisfies the given information:
Passes through $(1, -6)$ with a slope of $-\frac{1}{2}$.

- a. $y = \frac{-1}{2}x - 6.5$ b. $x + 2y + 11 = 0$ c. $y = \frac{1}{2}x + 6$ d. $2x + y + 6 = 0$

4. Identify the graph of $\sqrt{x+4}$.



5. Suppose that x varies jointly with y, z . When $y = 5$ and $z = -3$, $x = 30$. Which equation represents this statement as a formula?

- a. $x = \frac{-6y}{z}$ b. $x = 5y - 3z$ c. $x = \frac{10z}{y}$ d. $x = -2yz$ e. $x = -3yz$

6. Determine the average rate of change for the function $f(x) = x^2$ between $x = -1$ and 3.
- a. 8 b. 4 c. 2 d. -4 e. -8
7. Identify the vertex of the parabola: $f(x) = x^2 - 8x + 8$.
- a. (8,-8) b. (-8,4) c. (4,4) d. (4,-8) e. (4,-4)
8. Find $(f \circ g)(x)$ for $f(x) = x^2 + 4$ and $g(x) = x + 2$:
- a. $x^2 + 4x + 8$ b. $x^2 + 2$ c. $x^2 + 8$ d. $x^2 + 8x$ e. $x^2 + 6$
9. Find the inverse of the function $f(x) = \frac{1}{x+2}$.
- a. $f^{-1}(x) = \frac{1-2x}{x}$ b. $f^{-1}(x) = x+2$ c. $f^{-1}(x) = \frac{2x+1}{x}$ d. $f^{-1}(x) = 1 + \frac{2}{x}$
10. Suppose $P(x) = 2(x+3)^5 - 64$. What are the x-intercept(s) & y-intercept(s) of P(x)?
- a. y-int. = 422, x-int. = -1 b. y-int. = 422 x-int. = 1 c. y-int. = -1, x-int. = 112
- d. y-int. = 0 x-int. = 0 e. none of the above
11. Evaluate $(6x^2 - 26x + 12)/(x - 4)$:
- a. $6x - 2 + 4/(x - 4)$ b. $2x - 3 + 6/(x - 4)$ c. $6x - 4 - 4/(x - 4)$
- d. none of the above e. $2x + 3 - 6/(x-4)$
12. List all possible rational zeros of the polynomial $P(x) = 2x^5 + 5x^4 - 4x^3 + 7x - 3$ as given by the Rational Zeros Theorem.
- a. $\pm 1, \pm 2, \pm 3, \pm 3/2$ b. $\pm 1, \pm 2, \pm 3, \pm 1/2, \pm 3/2$ c. $\pm 1, \pm 2, \pm 3, \pm 2/3, \pm 1/2$
- d. $\pm 1, \pm 3, \pm 1/2, \pm 3/2$ e. none of the above
13. compute: $(3 + 5i)/(4 - 2i)$
- a. $13/10 + 2i/10$ b. $13/10 - i/10$ c. $1/10 - i/10$
- d. $1/10 + 13i/10$ e. none of the above

14. Let $Z=(5+2i)\cdot(5-2i)$. Find the Real part of Z and the imaginary part of Z , namely $\text{Re}(Z)$ and $\text{Im}(Z)$:

- a. $\text{Re}(z)=29$ $\text{Im}(z)=3$ b. $\text{Re}(z)=27$ $\text{Im}(z)=i$ c. $\text{Re}(z)=29$ $\text{Im}(z)=0$
 d. $\text{Re}(z)=21$ $\text{Im}(z)=0$ e. $\text{Re}(z) = 27$ $\text{Im}(z)=3i$

15. Let $P(x) = x^4 - 2x^3 - x + 3$. Use synthetic division to find the quotient when $P(x)$ is divided by $x - 3$

- a. $x^3 - 2x^2 - 1$ b. $x^3 - 2x^2 + 1$ c. $x^3 + x^2 + 3x + 8$
 d. $x^3 + \frac{2}{3}x^2 - 1$ e. -1

16. What are the vertical and horizontal asymptote(s) on the graph of $T(x) = (x^2 - x - 2)/(x^2 + 3x - 4)$?

- a. $x = -4, x = 1, y=1$ b. $x = 4, x = -1, y=1$ c. $x = -4, x = -1, y=1$
 d. $x = 4, x = 0, y=2$ e. a & b are correct

17. What value does $f(x) = \frac{2x^2 - x + 3}{x^2 - 1}$ converge to as $x \rightarrow \infty$?

- a. 0 b. 2 c. 1 d. -1 e. $f(x) \rightarrow \infty$ and "beyond"

18. Find the domain of $f(x) = \ln[x(x-3)]$.

- a. $x > 0$ b. $x > 3$ c. $x < 0$ or $x > 3$ d. $x \neq 0$ e. $x \geq 0$

19. Rewrite the following expression as a single logarithm.

$$\ln 3 + \ln(x-1) + \ln(x+1) =$$

- a) $\ln(x+1)^3$ b) $3 \ln(x^2 - 1)$ c) $\ln[3 + (x-1) + (x+1)]$ d) $\ln(3x^2 - 3)$ e) $\ln 3(x^2 - 1)$

20. If we use the change of base formula we can rewrite $\log_3 5$ as:

Hint: If you don't know the formula, write $y = \log_3 5$ in the equivalent exponential form and take logarithms with respect to a new base.

- a. $\frac{\log_3 3}{\log_3 5}$ b. $\frac{\log 3}{\log 5}$ c. $\frac{\log_7 5}{\log_7 3}$ d. $\frac{\ln 3}{\ln 5}$ e. $\frac{\log_5 e}{\log_3 e}$

21. Solve the following logarithmic equation for x .

$$\log_5(x+1) + \log_5(x-1) = 2$$

a) 5 b) ± 5 c) $\pm\sqrt{24}$ d) $\sqrt{24}$ e) $\sqrt{26}$

22. Solve the following exponential equation for x . $e^x = 2e^{4x+1}$

a. $1 - \frac{\ln 2}{3}$ b. $-\frac{1 + \ln 2}{3}$ c. $\frac{-1}{3}$ d. $e + \ln 2$ e. $2 \ln 2 - \frac{1}{3}$

23. How can you rewrite the following?

$${}_a(\log_a x + \log_b y) = ?$$

a) $\log_a x + \log_b y$ b) $\log_{ab} xy$ c) *none of these* d) $xa^{\log_b y}$ e) $x^{\log_b y}$

24. In the list below ALL of the values are equal EXCEPT for one choice. Which one is it?

(a) $\sin \frac{\pi}{6}$ (b) $\cos \frac{\pi}{3}$ (c) $\cos \frac{-\pi}{3}$ (d) $\sin 330^\circ$ (e) $\sin 150^\circ$

25. Suppose point $P(x, y)$ is on the unit circle where the y coordinate of P is $\frac{12}{13}$ and P is located in Quadrant 2. What is the x coordinate of P ?

(a) $\frac{1}{13}$ (b) $\frac{-13}{5}$ (c) $\frac{-5}{13}$ (d) $\frac{-25}{13}$ (e) $\frac{5}{13}$

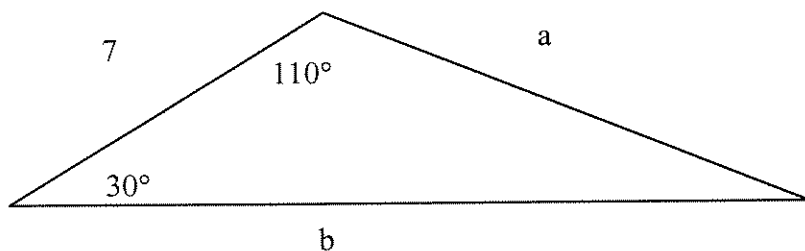
26. If $\cos t = \frac{-\sqrt{3}}{2}$ and the terminal point of t is in Quadrant 3, which of the following is also true?

(a) $\sec t = \frac{2\sqrt{3}}{3}$ (b) $\csc t = \frac{2\sqrt{3}}{3}$ (c) $\sin t = \frac{1}{2}$ (d) $t = \frac{\pi}{6}$ (e) $\tan t = \frac{\sqrt{3}}{3}$

27. Which of the following is false?

(a) $\csc \theta = \frac{1}{\sin \theta}$ (b) $\tan^2 \theta + 1 = \csc^2 \theta$ (c) $\cos^2 \theta = 1 - \sin^2 \theta$
 (d) $\frac{\tan \theta}{\cot \theta} = \tan^2 \theta$ (e) $\frac{\tan \theta}{\sec \theta} = \sin \theta$

28. Find the length of side a:



- (a) $\frac{7 \sin 40^\circ}{2}$ (b) $\frac{7}{2 \sin 40^\circ}$ (c) $14 \sin 40^\circ$ (d) $\frac{7\sqrt{3}}{2 \sin 40^\circ}$ (e) $7 \tan 30^\circ$

29. Which of the following is FALSE in Quadrant 4?

- (a) $2 \sin 2\theta = \sin \theta \cos \theta$ (b) $\cot \theta \sin \theta = \cos \theta$ (c) $\sec \theta \cot \theta = \csc \theta$
 (d) $\sin \theta < \cos \theta$ (e) $\cos \theta \geq 0$

30. What is the length of each side of an equilateral triangle with height = 4?

- (a) $4\sqrt{3}$ (b) 8 (c) $\frac{8\sqrt{3}}{3}$ (d) $\frac{4\sqrt{3}}{3}$ (e) $8\sqrt{3}$

31. If a triangle has sides of length 6 and 10 with the angle between them measuring 120° , what is the length of the remaining side of the triangle?

- (a) 7 (b) 11 (c) 13 (d) 14 (e) 17

32. If $f(x) = 4 \sin(\pi x - 1)$. What is the period of $f(x)$?

- (a) $\frac{2}{\pi}$ (b) π (c) 2 (d) $\frac{1}{2}$ (e) $\frac{\pi}{2}$

33. Which of the following IS defined?

- (a) $\cot(2\pi)$ (b) $\csc(\pi)$ (c) $\tan\left(\frac{-\pi}{2}\right)$ (d) $\sec(3\pi)$ (e) $\frac{1}{\sin(2\pi)}$