

Student Name: \_\_\_\_\_ Student No.: \_\_\_\_\_

1. Simplify  $\frac{x^2+4x}{x^2-5x+6} \div \frac{x+4}{x-2}$ .

(a)  $\frac{1+4x}{x+6}$

(b)  $\frac{x}{x+3}$

(c)  $\frac{1-4x}{x-1}$

(d)  $\frac{x}{x-3}$

2. Simplify  $\sqrt[3]{8x^5y^3 + 16x^3y}$ .

(a)  $2xy\sqrt[3]{x^2} + 2x\sqrt[3]{2y}$

(b)  $2xy\sqrt[3]{x^2 + 2y}$

(c)  $4x^2y\sqrt[3]{2x^2y}$

(d)  $2x\sqrt[3]{x^2y^3 + 2y}$

3. Find the solution of the equation  $x^2 - 6x + 4 = 0$ .

(a)  $3 \pm \sqrt{5}$

(b)  $-3 \pm \sqrt{5}$

(c)  $3 \pm 2\sqrt{5}$

(d)  $-3 \pm 2\sqrt{5}$

4. Find the solution set of the inequality  $\frac{x^2-9}{x-1} \leq 0$ .

(a)  $(1, 3]$

(b)  $(-\infty, -3] \cup (1, 3]$

(c)  $[-3, 1)$

(d)  $[-3, 1) \cup [3, \infty)$

5. Find an equation of the line passing through the point  $(-1, 0)$  and perpendicular to the line  $2x - 3y + 5 = 0$ .

(a)  $2x - 3y + 2 = 0$

(b)  $2y - 3x + 3 = 0$

(c)  $3x + 2y + 3 = 0$

(d)  $2x + 3y + 2 = 0$

6. Find an equation of the circle that has center  $(-2, 1)$  and radius 8.

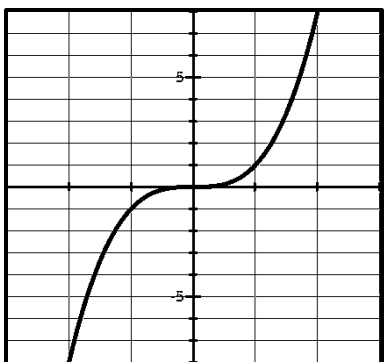
(a)  $(x - 2)^2 + (y + 1)^2 = 16$

(b)  $(x + 2)^2 + (y - 1)^2 = 16$

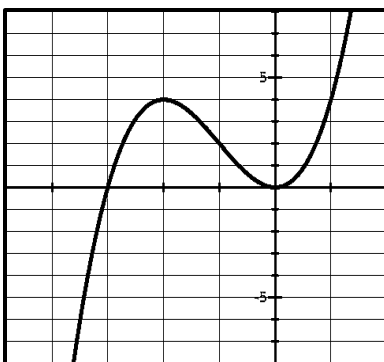
(c)  $(x + 2)^2 + (y - 1)^2 = 64$

(d)  $(x - 2)^2 + (y + 1)^2 = 64$

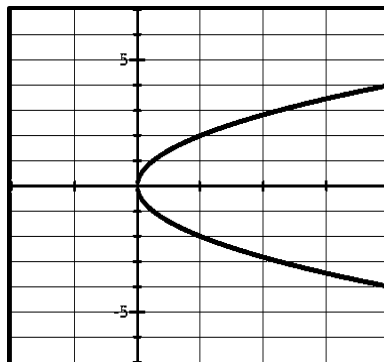
7. Which of the following graphs represents a function?



I



II



III

(a) III only

(b) I and II

(c) I and III

(d) II and III

8. Simplify  $\frac{x^{-2} - y^{-2}}{x^{-1} + y^{-1}}$ .

(a)  $\frac{1}{x-y}$

(b)  $x - y$

(c)  $\frac{y-x}{xy}$

(d)  $\frac{xy}{y-x}$

9. Let  $f(x) = 2x + 5$ . Find  $\frac{f(x+h)-f(x)}{h}$ .

(a) 2

(b) -2

(c)  $\frac{h-1}{h}$

(d)  $\frac{2h-2}{h}$

10. Solve the equation  $3x(2x - 1) - 6x^2 - x + 4 = 0$ .

(a) 1

(b) -2, 1

(c) -1

(d) -1, 2

11. Factor  $a^3 - 8b^3$ .

(a)  $(a - 2b)^3$

(b)  $(a - 2b)(a^2 - 4ab + 4b^2)$

(c)  $(a - 2b)(a^2 + 2ab + 4b^2)$

(d)  $(a - 4b^2)(a^2 + 2b)$

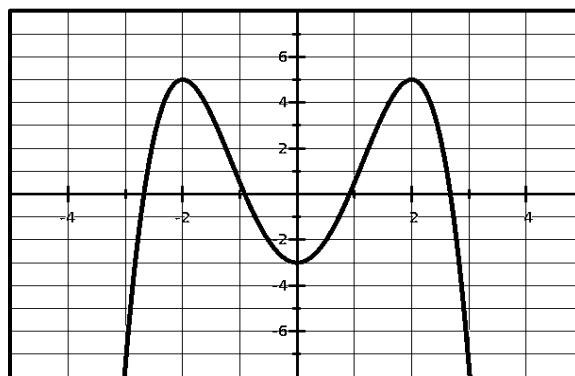
12. Given the graph of a function. Find the values of  $x$  for which it has a local maximum.

(a) 0, 5

(b) 1, 2

(c) 0, -3

(d) -2, 2



13. Find the value of  $x$  for which  $\log_2(5 - x) = 3$ .

(a) 2

(b) -3

(c) -1

(d) No Solution.

14. The graph of  $y = \ln(x + 2) - 3$  can be obtained from the graph of  $y = \ln x$  by shifting the graph of  $y = \ln x$ :

(a) Horizontally 2 units to the left and vertically 3 units upward.

(b) Horizontally 2 units to the right and vertically 3 units downward.

(c) Horizontally 2 units to the left and vertically 3 units downward.

(d) Horizontally 2 units to the right and vertically 3 units upward.

15. Let  $f(x) = \frac{e^{x+1} + 7}{2}$ . Find  $f^{-1}(x)$ .

(a)  $f^{-1}(x) = 2 \ln x - 6$

(b)  $f^{-1}(x) = \ln(2x - 7) - 1$

(c)  $f^{-1}(x) = \ln(2x) - 8$

(d)  $f^{-1}(x) = \ln(2x + 7) + 1$

16. Convert  $\theta = 120^\circ$  to radian measure.

- (a)  $\frac{5\pi}{6}$       (b)  $\frac{3\pi}{2}$       (c)  $\frac{\pi}{3}$       (d)  $\frac{2\pi}{3}$

17. Given that  $\tan \theta = \frac{5}{4}$  and  $\theta$  is in the third quadrant. Find  $\cos \theta$ .

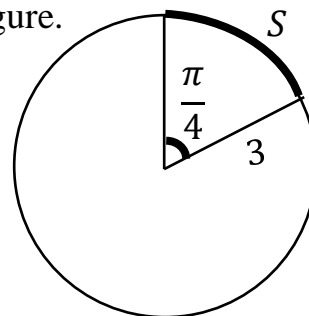
- (a)  $\frac{-3}{5}$       (b)  $\frac{-4}{\sqrt{41}}$       (c)  $\frac{-3}{4}$       (d)  $\frac{-5}{\sqrt{41}}$

18.  $(\sin x + \cos x)^2 =$

- (a)  $1 + \sin x \cos x$       (b)  $1 + \sin(2x)$   
(c)  $1 - \sin(2x)$       (d) 1

19. Find the length of the circular arc  $S$  in the given figure.

- (a)  $S = \frac{3\pi}{4}$       (b)  $S = \frac{12}{\pi}$   
(c)  $S = \frac{\pi}{12}$       (d)  $S = \frac{3\pi}{8}$



20. Simplify  $\frac{\cos y \sec y}{\tan y}$ .

- (a)  $\csc y$       (b)  $\tan y$       (c)  $\cot y$       (d)  $\sin y$

Name: \_\_\_\_\_

ID#: \_\_\_\_\_

**Solve each of the following questions:**

1. (5 points) Find the solution set of the trigonometric equation  $(\sin x - 5)(2 \cos x + 1) = 0$  in the interval  $[0, 2\pi)$ .

**Ans:**

$$(\sin x - 5)(2 \cos x + 1) = 0$$

**Either**

$$\sin x - 5 = 0$$

$$\Rightarrow \sin x = 5$$

No Solution

**Or**

$$2 \cos x + 1 = 0$$

$$\Rightarrow \cos x = -\frac{1}{2}$$

Reference angle is :  $\hat{\theta} = \frac{\pi}{3}$

$$2^{\text{nd}} \text{ quadrant } \theta = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$$

$$3^{\text{rd}} \text{ quadrant } \theta = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$$

$$\Rightarrow S = \left\{ \frac{2\pi}{3}, \frac{4\pi}{3} \right\}$$

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2. (5 points) Given an equation of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$ .

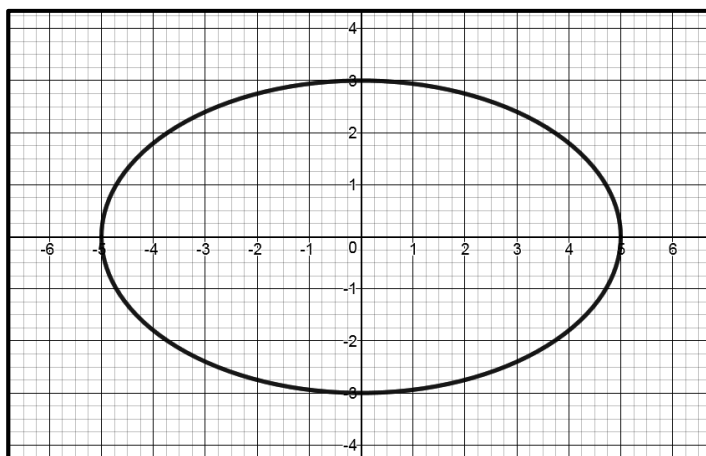
- Find the vertices.
- Find the y-intercepts.
- Sketch the graph of the equation.

**Ans:**

i.  $V(5,0)$  and  $V(-5,0)$

ii.  $(0,3)$  and  $(0,-3)$

iii. Sketch



3. (5 points) Let  $P(x) = x^3 - 3x^2 - 6x + 8$ .

a. Factor  $P(x)$  completely.

b. Find all zeros of  $P(x)$ .

**Ans:**

1	1	-3	-6	8
		1	-2	-8
	1	-2	-8	0

a.  $P(1) = 0$

$(x - 1)$  is a factor for  $P(x)$

$$P(x) = (x - 1)(x^2 - 2x - 8)$$

$$= (x - 1)(x - 4)(x + 2)$$

b. The zeros are:

$$x = 1, \quad x = 4, \quad x = -2$$

Answer Key:

Q	Answer	Q	Answer
1	D	11	C
2	D	12	D
3	A	13	B
4	B	14	C
5	C	15	B
6	C	16	D
7	B	17	B
8	C	18	B
9	A	19	A
10	A	20	C