

Sample Mathematics Placement Test

SAINT MARY'S UNIVERSITY

- The test contains a total of 40 multiple choice questions.
- Mark your answers (A, B, C, D or E) in the appropriate boxes below.
- You have 45 minutes to complete the test.
- **Calculators or other aids are not permitted.**

#	ANSWER
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#	ANSWER
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$$\frac{4}{5} - \frac{3}{4} =$$

1. (A) 1 (B) $\frac{1}{20}$ (C) $\frac{1}{16}$ (D) $\frac{1}{12}$ (E) 12
-

$$0.125 \times 4 =$$

2. (A) 55 (B) 0.55 (C) .055 (D) 0.45 (E) none of these
-

$$((1 - (2 - 1)) - 2) =$$

3. (A) 0 (B) 1 (C) -1 (D) -2 (E) 2
-

$$\frac{xy}{y - \frac{y}{x}} =$$

4. (A) $\frac{y^2}{x-1}$ (B) $\frac{x^2}{x-1}$ (C) $\frac{y^2}{1-x}$ (D) $\frac{x}{1-x}$ (E) $\frac{x}{x-1}$
-

$$\frac{1}{\sqrt{5} - \sqrt{3}} =$$

5. (A) $\frac{\sqrt{5} - \sqrt{3}}{2}$ (B) $\frac{\sqrt{8}}{2}$ (C) $\frac{\sqrt{5} + \sqrt{3}}{2}$ (D) $\frac{\sqrt{5} - \sqrt{3}}{8}$
(E) $\frac{\sqrt{5} + \sqrt{3}}{8}$
-

If $P = \sqrt{\frac{\alpha + \beta^2}{M}}$, where $\alpha = 3$, $\beta = 5$, and $M = 7$, then $P =$

6. (A) $\frac{3}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) 2 (D) $\frac{1}{2}$ (E) $\sqrt{3}$
-

Consider only $(x - 1)$, $(x + 1)$ and $(x - 2)$ as possible factors of $x^3 + x^2 + x + 1$. Of these only

7. (A) $(x - 1)$ is a factor (B) $(x + 1)$ is a factor (C) $(x - 2)$ is a factor
(D) $(x - 1)$ and $(x + 1)$ are factors. (E) None of the preceding are true.
-

$$(x^2 + 1)(x^5 + x^3 + 1) =$$

8. (A) $x^7 + x^5 + x^3 + x^2 + 1$ (B) $x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + x + 1$
(C) $x^7 + 2x^5 + 2x^3 + 2x + 1$ (D) $x^7 + 2x^5 + x^3 + x^2 + 1$
(E) $x^7 + 2x^5 + 2x^3 + 2x^2 + 1$
-

If $2x^2 - x = 1$, then $x =$

9. (A) $-\frac{1}{2}$ or 1 (B) 2 or 1 (C) $-\frac{1}{2}$ or 2
(D) 1 or -1 (E) $\frac{1}{2}$ or 1
-

If $x + 2y = 3$, and $2x - y = 3$, then (x, y)

10. (A) $(1, 1)$ (B) $(\frac{3}{2}, \frac{3}{2})$ (C) $(\frac{9}{4}, -\frac{1}{4})$ (D) $(\frac{9}{5}, \frac{3}{5})$
(E) = none of these
-

If $f(x) = x^4 - 2x^3 + x$, then $f(\frac{1}{2}) =$

11. (A) $\frac{x^4 - 2x^3 + x}{16}$ (B) $\frac{5}{16}$ (C) $\frac{1}{16}$ (D) 0 (E) $\frac{x^3 - x^2}{16}$
-

If $f(x) = 1 + x^2$, then $f(1 - x) =$

12. (A) $1 - x - x^2$ (B) $2 - x^2$ (C) $1 - 2x - x^2$ (D) $x^2 - 2x + 2$
(E) none of these
-

If $f(x) = x^2 + x$, then $f(x - h) =$

13. (A) $x^2 - x + h$ (B) $x^2 + h^2 - x - h$ (C) $x^2 + h^2 - x + h$
(D) $x^2 + 2hx + h^2 - x + h$ (E) none of these
-

If $f(x) = x^2 + xb$, then $f(x + b) =$

14. (A) $x^2 + 2bx + b^2$ (B) $x^2 + 3bx + b^2$ (C) $x^2 + 3bx + 2b^2$
(D) $x^2 + xb + b$ (E) none of these
-

If $|x + 2| - 1 < 7$, then which of these follows?

15. (A) $x < 6$ (B) $x > -10$ (C) $x > -2$
(D) $-10 < x < 6$ (E) none of these
-

Let x be the length of the side of a square. If each side is decreased by 2 inches, the area of the square is decreased by 100 square inches. What is the area of the square after the sides are decreased?

16. (A) 526square inches (B) 426square inches (C) 476square inches
(D) The area cannot be determined from the information given
(E) None of the above is correct
-

$$2^0 + 1^{-2} =$$

17. (A) 1 (B) 2 (C) $2\frac{1}{2}$ (D) 3 (E) none of these
-

If $3^x = 5$, then

18. (A) $\log_3(5) = x$ (B) $\log_x(3) = 5$ (C) $\log_x(5) = 3$
(D) $\log_3(x) = 5$ (E) none of these are true
-

$$\log_{10}(9) - \log_{10}(3) =$$

19. (A) $\log_{10}(6)$ (B) $\log_9(3)$ (C) $\log_{10}(27)$ (D) $\log_{10}(\frac{1}{2})$
(E) none of these
-

$$\frac{x-1}{x+1} - \frac{x-2}{x-1} =$$

20. (A) $\frac{1-2x}{x^2-1}$ (B) $\frac{3x-2}{x^2-1}$ (C) 1 (D) $\frac{3+x}{x^2-1}$
(E) none of these
-

The function $p(x) = (x^2 + 1)(x - 1)$

21. (A) changes sign three times
(B) changes sign twice
(C) changes sign once
(D) is always positive
(E) is always negative
-

The slope of the line passing through the points $(-1, 0)$ and $(1, 3)$ is

22. (A) $\frac{3}{2}$ (B) 3 (C) -2 (D) $\frac{2}{3}$ (E) 2
-

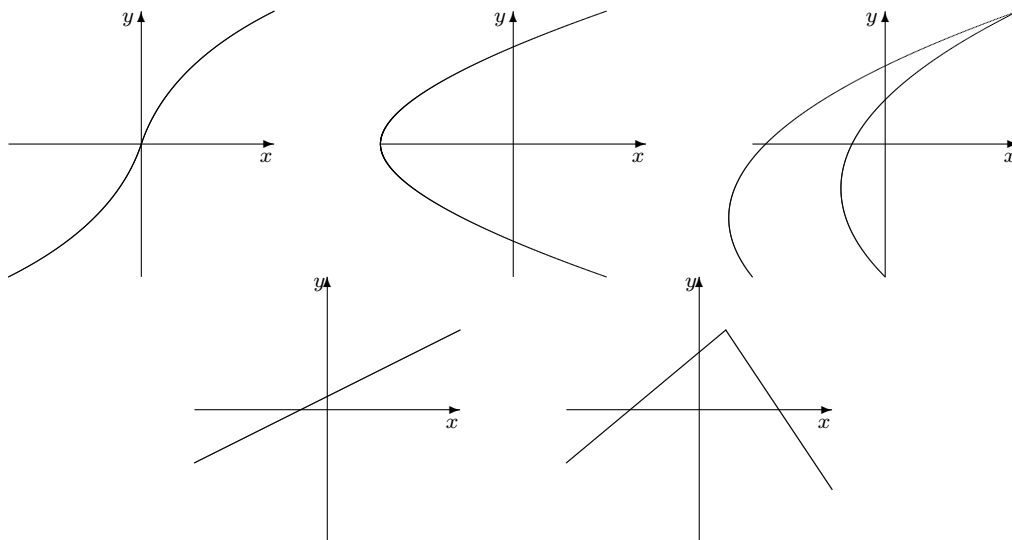
The slope of the line perpendicular to the line $2y = 3x + 1$ is

23. (A) -1 (B) $-\frac{2}{3}$ (C) $\frac{1}{3}$ (D) $-\frac{1}{3}$ (E) none of these
-

The distance between the points $(-1, 2)$ and $(5, -5)$ is

24. (A) 13 (B) $\sqrt{5}$ (C) 5 (D) $\sqrt{55}$ (E) $\sqrt{85}$
-

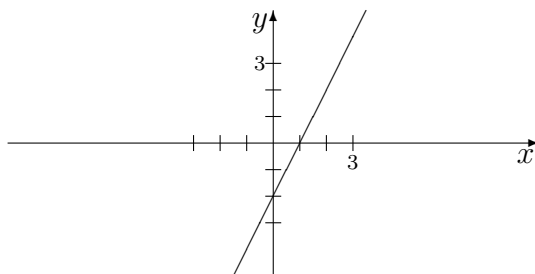
For the following set of graphs, which statement is true?



25.

- (A) They are all graphs of functions
- (B) Exactly four of them are graphs of functions
- (C) Exactly three of them are graphs of functions
- (D) Exactly two of them are graphs of functions
- (E) Exactly one of them is a graph of a function

Which equation has this line as its graph?



26.

- (A) $y = x - 1$
- (B) $y = \frac{1}{2}x + 1$
- (C) $x + y = 1$
- (D) $y = 2x - 2$
- (E) none of these

How many of the following equations represent straight lines?

$xy = 9$ $x^2 + y^2 = 4$ $x + 1 = y^2$ $x + y = 16$

27.

- (A) none
- (B) one equation
- (C) two equations
- (D) three equations
- (E) all four equations

How many of the following equations represent parabolas?

$x^2 - y = 9$ $5x + y^2 = 4$ $x^2 + 1 = -y^2$ $x^2 - y = 0$

28.

- (A) none
- (B) one equation
- (C) two equations
- (D) three equations
- (E) all four equations

The area of a triangle with base of length 3 and height (or altitude) of 10 is

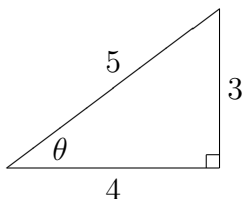
- 29. (A) 13
- (B) $\sqrt{13}$
- (C) 15
- (D) $\sqrt{30}$
- (E) none of these

Which of the following curves passes through the points $(1, 2)$ and $(2, -1)$?

30. (A) $x^2 - y^2 = 5$ (B) $x = y - 3$ (C) $y = 5 - 3x$
 (D) $x^2 + y^2 = 3$ (E) none of these
-

In the following diagram $\tan \theta =$

31.



- (A) $\frac{5}{4}$ (B) $\frac{4}{5}$ (C) $\frac{3}{4}$ (D) $\frac{3}{5}$ (E) none of these
-

Which of these is $\frac{\pi}{2}$ radians?

32. (A) 57.3° (B) $\frac{22^\circ}{7}$ (C) 90° (D) 180° (E) none of these
-

$\sin(60^\circ)$ is

33. (A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) 1 (E) none of these
-

$\tan(-\pi)$ is

34. (A) -1 (B) 0 (C) 1 (D) undefined (E) none of these
-

If $\sin \theta = \frac{2}{5}$ and θ is in the first quadrant, then $\cos \theta =$

35. (A) $\frac{3}{5}$ (B) $\frac{\sqrt{21}}{5}$ (C) $\frac{\pi}{7}$ (D) $\frac{5}{3}$ (E) none of these
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$\sin(2x) =$

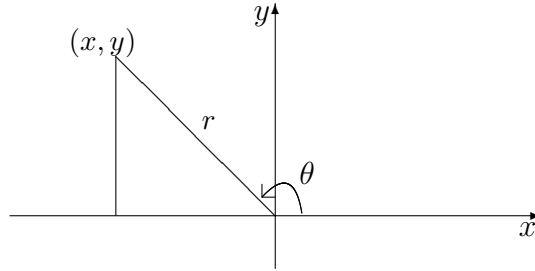
36. (A) $2 \sin(x)$ (B) $2 \cos(x) \sin(x)$ (C) $\cos(x) \sin(x)$
 (D) $\cos^2(x) - \sin^2(x)$ (E) none of these
-

$\sin^2\left(\frac{\pi}{4}\right) - \cos^2\left(\frac{\pi}{4}\right) =$

37. (A) 1 (B) 0 (C) $\frac{2}{\sqrt{2}}$ (D) $\frac{\sqrt{2}}{2}$ (E) none of these
-

In the following diagram $\cot \theta =$

38.



- (A) $\frac{x}{r}$ (B) $\frac{x}{y}$ (C) $\frac{y}{r}$ (D) $\frac{y}{x}$ (E) none of these
-

For the equation $\cos^2(x) - 3\cos(x) + 2 = 0$ in the interval $[-\pi, \pi]$:

39.

- (A) there are no solutions
(B) there is exactly one solution
(C) there are exactly two solutions
(D) there are exactly three solutions
(E) none of the above is true
-

The equation $2^{2\sin x} + 2^{\sin x} - 6 = 0$ has

40.

- (A) only the solution $x = \frac{\pi}{2}$
(B) the solutions $x = \frac{\pi}{2} + k\pi$, k any integer
(C) the solutions $x = \frac{\pi}{2} + 2k\pi$, k any integer
(D) only the solution $x = \pi$
(E) the solutions $x = k\pi$, k any integer
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Answer Key

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

#	Answer
21.	C
22.	A
23.	B
24.	E
25.	C
26.	D
27.	B
28.	D
29.	C
30.	C
31.	C
32.	C
33.	A
34.	B
35.	B
36.	B
37.	B
38.	B
39.	B
40.	C