

Sample Precalculus Placement Exam

No calculators.

1. $|x + 3| \leq 2$ is equivalent to:

- a.** $-5 \leq x \leq -1$ **b.** $1 \leq x \leq 5$ **c.** $-5 \leq x \leq 1$ **d.** $2 \leq x \leq 3$ **e.** $-2 \leq x \leq 3$

2. The slope of the straight line joining $(2, -1)$ and $(-3, 4)$ is:

- a.** $-\frac{1}{5}$ **b.** $\frac{1}{5}$ **c.** $\frac{3}{5}$ **d.** -1 **e.** 1

3. The real solutions of $x^2 - 4x - 2 = 0$ are:

- a.** $2 \pm \sqrt{6}$ **b.** $\frac{1 \pm \sqrt{6}}{2}$ **c.** none **d.** $-2 \pm \sqrt{6}$ **e.** $4 \pm 2\sqrt{6}$

4. The equation of the straight line through $(-2, 3)$ with slope $-\frac{5}{4}$ is:

- a.** $4x - 5y + 23 = 0$ **b.** $5x + 4y - 2 = 0$ **c.** $4x + 5y - 7 = 0$
d. $5x - 4y + 22 = 0$ **e.** $5x + 4y + 2 = 0$

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

- a.** $27x^3 + 8$ **b.** $9x^2 + 12x + 4$ **c.** $216x^3$
d. $27x^3 + 18x^2 + 12x + 8$ **e.** $27x^3 + 54x^2 + 36x + 8$

6. Solve for x : $\log_2(x + 1) - \log_2(x - 1) = 2$

- a.** 3 **b.** $\frac{5}{3}$ **c.** $\frac{3}{5}$ **d.** no solution **e.** 2

7. Rationalize the denominator: $\frac{1}{\sqrt{5}+2}$

- a. $\sqrt{5}-2$ b. $5+\sqrt{2}$ c. $\frac{\sqrt{5}-2}{3}$ d. $\frac{2\sqrt{5}+5}{10}$ e. $\frac{\sqrt{5}+2}{5}$

8. Simplify: $\frac{\frac{1}{x+1} + \frac{1}{x}}{\frac{1}{x+1} - \frac{1}{x}}$

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

9. The length of a rectangle is 3 less than 4 times its width. Its area is 10. Find the width of the rectangle.

- a. 8 b. 5 c. 2 d. $-\frac{5}{4}$ e. no solution

10. The distance between the points $(4, -5)$ and $(1, 2)$ is:

- a. 10 b. $2\sqrt{10}$ c. $10\sqrt{2}$ d. $4\sqrt{3}$ e. $\sqrt{58}$

11. Factor $x^7 - 81x^3$:

- a. $x^3(x-3)(x+3)(x^2+9)$ b. $x^5(x-9)^2$ c. $x^3(x-3)^4$
d. $x^6(x-81)$ e. $x^3(x-9)(x+9)(x^2+3)$

12. If $f(x) = x^2 - 2$ then $f(x+2)$

- a. $x^2 - 2x + 4$ b. x^2 c. $x^2 + 4x + 2$ d. $x^2 + 2$ e. $x^2 + 2x + 2$

13. $16^{-3/4} 27^{4/3} =$

a. $-\frac{27}{16}$

b. $-\frac{81}{8}$

c. $\frac{9}{4}$

d. $\frac{8}{81}$

e. $\frac{81}{8}$

14. The curves $y = 3x + 5$ and $y = x^2 + 1$ intersect at:

a. $(5, 1)$ **b.** $(4, 2)$ and $(-1, 17)$ **c.** $(4, -1)$ **d.** $(4, 17)$ and $(-1, 2)$ **e.** nowhere

15. $\cos \frac{\pi}{4} =$

a. 1

b. 0

c. $\frac{\sqrt{2}}{2}$

d. $\frac{\sqrt{3}}{2}$

e. $\frac{1}{2}$

16. $\sin \frac{4\pi}{3} =$

a. $\frac{\sqrt{3}}{2}$

b. $\frac{1}{2}$

c. $-\frac{1}{2}$

d. $-\frac{\sqrt{3}}{2}$

e. $-\frac{2}{3}$

17. $\cos^2 \theta =$

a. $1 - \sin^2 \theta$

b. $1 + \sin^2 \theta$

c. $2 \cos \theta$

d. $2 \sin \theta \cos \theta$

e. $(1 - \sin \theta)^2$

18. $\sin \theta \cos \theta \cot \theta =$

a. $\cos^2 \theta$

b. 1

c. $\sin^2 \theta$

d. $\tan \theta$

e. $\sin \theta$

19. $\sec^2 x =$

a. $\sec 2x$

b. $\sec(x^2)$

c. $2 \sec x$

d. $1 + \tan^2 x$

e. $\tan^2 x - 1$

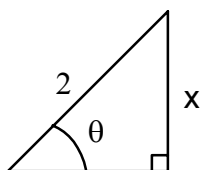
20. $e^{3 \ln 2} =$

- a. $\ln 6$ b. 8 c. 9 d. $\ln 8$ e. 5

21. $\ln(x - y) =$

- a. $\ln x - \ln y$ b. $\ln x + \ln y$ c. $\ln \frac{x}{y}$ d. $\frac{\ln x}{\ln y}$ e. none of these

22. In the triangle shown, $\tan \theta =$



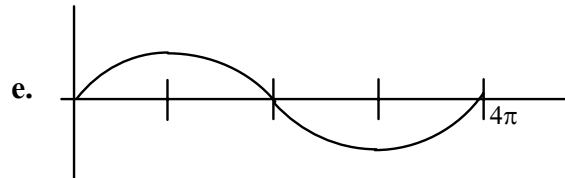
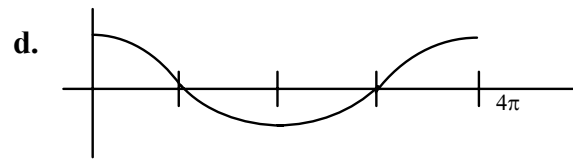
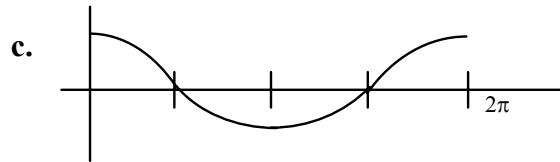
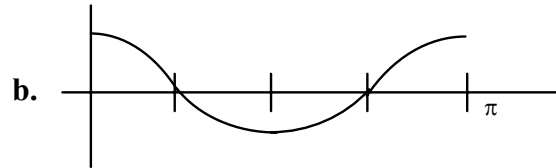
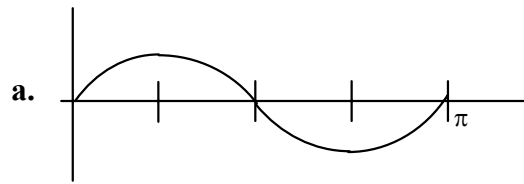
- a. $\frac{x}{2}$ b. x c. $\frac{\sqrt{4+x^2}}{x}$ d. 2 e. $\frac{x}{\sqrt{4-x^2}}$

23. Simplify $\ln \frac{e^4 x^2 y^3}{z^4 w} =$

- a. $(\ln e^4)(\ln x^2)(\ln y^3) / (\ln z^4)(\ln w)$ b. $e^4 + \ln x^2 + \ln y^3 - \ln z^4 - \ln w$
 c. $e^4 + 2 \ln x + 3 \ln y - 4 \ln z - \ln w$ d. $4 + 2 \ln x + 3 \ln y - 4 \ln z - \ln w$
 e. $4 + 2 \ln x + 3 \ln y - 4 \ln z + \ln w$

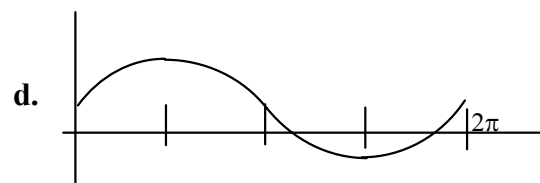
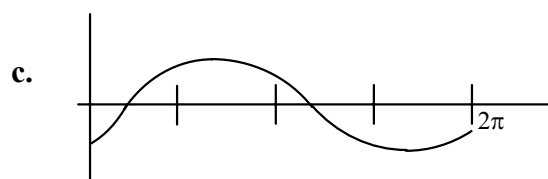
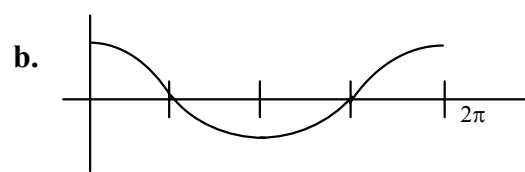
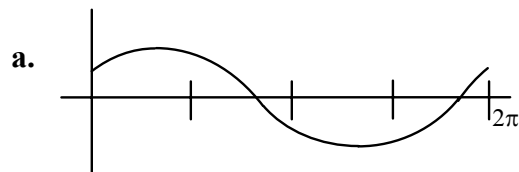
24. Which graph best represents one cycle of $y = \cos 2x$?

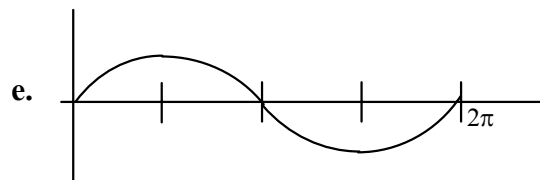
[These graphs are drawn to scale with equal spacing along the x-axis, and with a max and min of 1 and -1 , respectively, for y .]



25. Which graph best represents one cycle of $y = \sin\left(x - \frac{\pi}{4}\right)$?

[These graphs are drawn to scale with equal spacing along the x-axis, and with a max and min of 1 and -1 , respectively, for y .]





26. Multiply and simplify: $y^3(y+1)^2$.

- (a) $y^5 + 2y^4 + y^3$ (b) $y^5 + y^3$ (c) $y^6 + 2y^3 + 1$
 (d) $y^6 + y^3$ (e) none of the above

27. Simplify $(-3x^{-5})^{-2}$.

- (a) $9x^{10}$ (b) $-9x^{-7}$ (c) $\frac{1}{9}x^{10}$
 (d) $\frac{1}{9}x^{-7}$ (e) $\frac{1}{9}x^{-10}$

28. Simplify $\frac{5^{-2}x^{-3}y^2}{x^{-4}y}$.

- (a) $-10xy$ (b) $\frac{-25y}{x}$ (c) $25xy$
 (d) $\frac{xy}{25}$ (e) $\frac{y}{25x}$

29. Simplify $\frac{5}{x-3} - \frac{x}{x^2-9}$.

(a) $4x^2 + 3x - 45$

(b) $4x + 15$

(c) $\frac{4x+15}{x^2-9}$

(d) $\frac{5-x}{x^2-9}$

(e) $\frac{5-x}{x-x^2+6}$

30. Simplify $\frac{\frac{1}{x^2}}{1-\frac{1}{x}}$.

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

(b) $\frac{1-x}{x^2}$

(c) $\frac{x^2}{1-x}$

(d) $\frac{1}{x(x-1)}$

(e) x

31. Simplify $\sqrt{24x^3} + \sqrt{x^2 + 25}$. (Assume that x is a non-negative number.)

(a) $8x\sqrt{3x} + \sqrt{x^2 + 25}$

(b) $2x\sqrt{3x} + \sqrt{x^2 + 25}$

(c) $2x\sqrt{6x} + \sqrt{x^2 + 25}$

(d) $\sqrt{24x^3 + x^2 + 25}$

(e) $2x\sqrt{6x} + x + 5$

32. Evaluate $(-8)^{2/3}$.

(a) -4

(b) $-\frac{16}{3}$

(c) $-(\sqrt{8})^3$

(d) 4

(e) none of the above

33. Which of the following are true? I. $\cos 0 = 0$ II. $\ln(0) = 0$ III. $\tan 0 = 0$

(a) I. and II. only (b) I. and III. only (c) I only (d) II. only (e) III. only

34. Which of the following are true? I. $\sqrt{4} = \pm 2$ II. $3^{-\frac{1}{2}} = \frac{1}{3^2}$ III. $\tan 1 = \frac{\pi}{4}$

(a) I. and II. only (b) I. and III. only (c) I only (d) all (e) none

35. If $x = \sin \theta$, $0 < \theta < \frac{\pi}{2}$, then $\sec \theta =$

(a) $\sqrt{1 - x^2}$ (b) $\frac{1}{x}$ (c) $\frac{1}{\sqrt{1 - x^2}}$ (d) $\frac{x}{\sqrt{1 - x^2}}$ (e) $\frac{\sqrt{1 - x^2}}{x}$

Answer Key

1. A	2. D	3. A	4. B	5. E	6. B	7. A	8. B
9. C	10. E	11. A	12. C	13. E	14. D	15. C	16. D
17. A	18. A	19. D	20. B	21. E	22. E	23. D	24. B
25. C	26. A	27. C	28. D	29. C	30. D	31. C	32. D
33. E	34. E	35. C					

Number Correct

Estimated Grade

35 - 32

A

31 - 29

B

28 - 25

C (The minimum score necessary for enrollment in Math 1337)