

Pre-Calculus Practice Worksheet

Fifty questions on functions and transformations, trigonometry, polynomial and rational behavior, exponentials and logs, and limits. Questions 45 to 50 ask for written working.

QUESTIONS	50	MULTIPLE CHOICE	14	WRITTEN	36
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Instructions

Use exact trig values, not decimal approximations, unless a question says otherwise.

1

If $f(x) = 2x - 3$, find $f(5)$.

2

If $f(x) = x^2 + 1$ and $g(x) = x - 2$, find $(f \circ g)(4)$.

3

If $f(x) = x^2 + 1$ and $g(x) = x - 2$, find $(g \circ f)(4)$.

4

The graph of $y = f(x) + 5$ is the graph of $f(x)$ shifted:

- A) Up 5
- B) Down 5
- C) Left 5
- D) Right 5

5

The graph of $y = f(x - 3)$ is the graph of $f(x)$ shifted:

- A) Left 3
- B) Right 3
- C) Up 3
- D) Down 3

6

Find the inverse of $f(x) = 3x + 6$.

7

A function has domain restriction because its formula includes:

- A) x^2
- B) $\sqrt{x}$
- C) $3x$
- D) $x + 1$

8

Evaluate $\sin(30 \text{ degrees})$ exactly.

9

Evaluate $\cos(45 \text{ degrees})$ exactly.

10

Evaluate $\tan(45 \text{ degrees})$ exactly.

11 Evaluate $\sin(90 \text{ degrees})$ exactly.

12 Evaluate $\cos(0 \text{ degrees})$ exactly.

13 If $\sin(x) = 3/5$ and x is in Quadrant I, what is $\cos(x)$?
A) $4/5$
B) $3/4$
C) $5/3$
D) $-4/5$

14 What is the period of $y = \sin(x)$?

15 What is the period of $y = \tan(x)$?

16 What is the amplitude of $y = 3\sin(x)$?
A) 1
B) 2
C) 3
D) 6

17 Which identity is always true?
A) $\sin(x) + \cos(x) = 1$
B) $\sin^2(x) + \cos^2(x) = 1$
C) $\sin(x) = \cos(x)$
D) $\tan(x) = \sin(x) + \cos(x)$

18 Convert 180 degrees to radians.

19 Convert $\pi/2$ radians to degrees.

20 As $x \rightarrow \infty$, what does $y = x^4 - 3x^2$ do (even degree, positive leading term)?
A) Rises on both ends
B) Falls on both ends
C) Rises left, falls right
D) Falls left, rises right

21 As $x \rightarrow \infty$, what does $y = -x^3 + 2x$ do (odd degree, negative leading term)?
A) Rises on both ends
B) Falls on both ends
C) Rises left, falls right
D) Falls left, rises right

22 Find the vertical asymptote of $f(x) = 1/(x - 5)$.

23 Find the vertical asymptotes of $f(x) = (x+2)/(x^2-9)$.

24 Find the horizontal asymptote of $f(x) = (2x+1)/(x-3)$.
A) $y = 0$
B) $y = 2$
C) $y = 1/3$
D) None

25 Find the horizontal asymptote of $f(x) = (x+1)/(x^2+1)$.
A) $y = 0$
B) $y = 1$
C) $y = x$
D) None

- 26** Factor and find the zeros of $f(x) = x^2 - 5x + 6$.

- 27** Evaluate: $\log_2(32)$.

- 28** Evaluate: $\log_{10}(1000)$.

- 29** Solve: $e^x = 7.4$. (round to two decimals)

- 30** Solve: $\log(x) = 3$.

- 31** Which function models exponential decay?

- A) $y = 4(1.1)^x$
- B) $y = 4(0.75)^x$
- C) $y = 4x$
- D) $y = 4x^2$

- 32** Find lim as x approaches infinity of $(5x + 2)/(x - 1)$.

- 33** Find lim as x approaches infinity of $(3x^2 + 1)/(x^3 - 2)$.

- 34** Find lim as x approaches infinity of $(4x^3 - 1)/(x^2 + 5)$.

- 35** Find the 10th term of the arithmetic sequence $a_1 = 5$, $d = 4$.

- 36** Find the 5th term of the geometric sequence $a_1 = 3$, $r = 2$.

- 37** The graph of $y = -f(x)$ is the graph of $f(x)$:

- A) Shifted up
- B) Reflected over the x -axis
- C) Reflected over the y -axis
- D) Stretched vertically

- 38** The graph of $y = f(-x)$ is the graph of $f(x)$:

- A) Reflected over the x -axis
- B) Reflected over the y -axis
- C) Shifted left
- D) Shifted right

- 39** Simplify: $\log(x^3 y)$.

- 40** Solve: $2\sin(x) = 1$ for $0 \leq x < 360$ degrees.

41 Which point lies on the unit circle at 90 degrees?

- A) (1, 0)
- B) (0, 1)
- C) (-1, 0)
- D) (0, -1)

42 A function is even if $f(-x) = f(x)$. Is $f(x) = x^2 - 3$ even, odd, or neither?

43 Is $f(x) = x^3 + x$ even, odd, or neither?

44 Find the domain of $f(x) = \sqrt{x-4}$.

45 Find the domain of $f(x) = 1/(x^2 - 9)$.

46 A Ferris wheel's height is modeled by $h(t) = 20\sin(t) + 25$. Find the maximum height and explain how you found it from the formula.

47 Explain why $f(x) = x^2$ does not have an inverse function unless its domain is restricted.

48 A population is modeled by $P(t) = 500 e^{0.03t}$. Find $P(10)$ rounded to the nearest whole number and explain what 0.03 represents.

49 Show that $\sin(x)/\cos(x)$ simplifies to $\tan(x)$, and explain why this identity always holds where $\cos(x) \neq 0$.

50 Explain the difference between the domain restriction of $\sqrt{x}$ and the domain restriction of $1/x$.

Answer key

Direct answers only, in question order. Work the set first, then check.

1. 7	2. 5	3. 15	4. A) Up 5	5. B) Right 3
6. $f^{-1}(x) = (x - 6)/3$	7. B) $\sqrt{x}$	8. $1/2$	9. $\sqrt{2}/2$	10. 1
11. 1	12. 1	13. A) $4/5$	14. 2π	15. π
16. C) 3	17. B) $\sin^2(x) + \cos^2(x) = 1$	18. π	19. 90	20. A) Rises on both ends
21. C) Rises left, falls right	22. $x = 5$	23. $x = 3$ and $x = -3$	24. B) $y = 2$	25. A) $y = 0$
26. $x = 2$ and $x = 3$	27. 5	28. 3	29. 2.0	30. 1000
31. B) $y = 4(0.75)^x$	32. 5	33. 0	34. infinity (no finite limit)	35. 41
36. 48	37. B) Reflected over the x-axis	38. B) Reflected over the y-axis	39. $3 \log(x) + \log(y)$	40. $x = 30$ or $x = 150$
41. B) (0, 1)	42. Even	43. Odd	44. $x \geq 4$	45. all real numbers except $x = 3$ and $x = -3$
46. 45; the maximum of $\sin$ is 1, so $20(1) + 25 = 45$	47. Because it fails the horizontal line test — two inputs (e.g. 2 and -2) give the same output, so swapping x and y does not define a function.	48. 675; 0.03 is the continuous growth rate of 3% per time unit	49. $\tan(x)$ is defined as $\sin(x)/\cos(x)$, so the identity holds by definition wherever $\cos(x)$ is not zero	50. $\sqrt{x}$ requires $x \geq 0$ because negative numbers have no real square root; $1/x$ requires $x \neq 0$ because division by zero is undefined

Error log

Bring this page to your next session so the tutor can start from what actually blocked you.

Questions I answered incorrectly:

Was it the concept, the setup, or the arithmetic?

The single topic I want to start the next session with:
