

CA12 Functions and Graphs Practice (DO NOT WRITE ON THIS PAPER)

In this section, we will revisit key functions covered in Pre-Calculus 12, refreshing your understanding of these foundational concepts. Additionally, you will delve into piecewise functions, compare even and odd functions, and explore the properties of inverse trigonometric functions. Visit hunkim.com/13 for more Calculus 12 resources.

- Parent functions from Pre-Calculus 12
(ex. exponential, logarithmic, polynomial, rational, trigonometric)
- Piecewise functions
- Inverse trigonometric functions

1. Calculus is the study of continuous c_____, and was developed independently in the late 17th century by N_____ and L_____.

2. Another word for instantaneous slope is rate of c_____.

3. Calculus is the mathematical study of change. Give an example of how Calculus is relevant to many fields of study such as Biology or Economics.

4. Sketch $y = 3^{-x} - 2$

5. Sketch $y = e^x + 2$

6. Sketch $y = \log_2(x - 1)$

7. Sketch $y = \frac{-\ln x^3}{2}$

8. Sketch $y = x^3 - 3x^2 + 4$

9. Sketch $y = \frac{3x-2}{x+1}$

10. Sketch $y = \frac{2x^2-4x}{x^3-x^2-2x}$

11. Sketch $y = -2 \cos 2x + 2$

12. Sketch $y = \tan\left(\frac{2\pi x}{3}\right)$

13. Sketch $f(x) = \begin{cases} x^2 - 2x + 1 & x < 4 \\ 6 & x = 4 \\ \frac{x}{2} + 7 & x > 4 \end{cases}$

14. Sketch $f(x) = \begin{cases} 6 & x \leq 0 \\ 6 - 2x & 0 < x < 3 \\ \sqrt{x-2} - 1 & x > 3 \end{cases}$

15. $y = \arcsin x$

16. $y = \cos^{-1} x$

17. $f(\theta) = \arctan \theta$

18. $g(x) = \begin{cases} -(x-2)^2 + 4 & x < 3 \\ y = 2x + k & x \geq 3 \end{cases}$

Find the value of k so that $g(x)$ is continuous (defined $x \in \mathbb{R}$)

19. Sketch $y = \sqrt{9 - x^2}$

20. Sketch $y = \frac{x-1}{|x-1|}$

21. Sketch $y = \csc x$

22. Even function, odd function, or neither?

a. $f(x) = x^4 - 2x^2$

b. $f(x) = 2x + 3$

c. $f(x) = x^3 + x$

d. $f(x) = \tan x + x$

e. $f(x) = \cos^2(2x)$

f. $f(x) = e^x + \ln x$

g. $f(x) = \frac{1}{x}$

h. $f(x) = y$

Challenge

23. Inverse functions:

a. $f(x) = 2^{x-1}$. Find $f^{-1}(x - 1)$

b. $f(x) = (x - 2)^2 - 4, x \geq 2$. Find $g(x) = 2f^{-1}(x)$

c. $f(x) = x^2 + 4x - 1$. Find $f^{-1}(x)$

24. Sketch $(x - 2)^2 + (y - 3)^2 = 25$

25. Sketch $4x^2 + 9y^2 = 36$

26. Sketch $y = |2x - 6| + 1$

27. Sketch $y = 4 - \frac{1}{(x-2)^2}$

28. Sketch $y = \log_2 x^2$

29. Sketch $y = |\sin x|$

30. $f(x) = 1 - \cos^2 x$

a. Sketch $y = \sin^2 x$

b. Find $g(x) = f(x) = a \cos(2x) + b$

31. Sketch $y = \operatorname{arccsc} x$

32. Sketch $f(x) = \sec^{-1} x$

33. $f(x) = \tan x$

a. Describe $\cot x$ as a transformation of $\tan x$

b. Sketch $\cot^{-1} x$