

Math 121

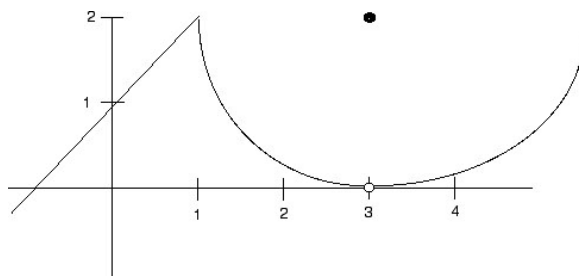
Test 1 - Review 1

Find the domain for:

1. $f(x) = \frac{5x-7}{7x+10}$
2. $f(x) = \sqrt{\frac{x+9}{x-1}}$
3. $f(x) = \sqrt{30-13x-x^2}$
4. Find the equation of the line that passes through $(-1, 4)$ and $(2, 7)$.
5. Find $(f \circ g)(x)$ if $f(x) = \frac{4x}{1+x^2}$ and $g(x) = \sqrt{3x}$
6. Find $(g \circ f)(x)$ if $f(x) = 2x+3$ and $g(x) = \frac{1}{x}$.
7. Express $h(x) = \sqrt{x^2-16}$ as the composition of two functions such that $h(x) = (f \circ g)(x)$
8. Find $\sin \theta$ and $\cos \theta$ if $\cot \theta = 4$ and $0 \leq \theta < \pi/2$

For each of the following, find the exact value:

9. $\cot \left(\arcsin \left(-\frac{1}{2} \right) \right)$
10. $\sin \left(\arctan \left(-\frac{3}{5} \right) \right)$
11. $\log_4 1024$
12. $\log_5 \frac{1}{25}$
13. $\sinh(\ln 3)$
14. Solve for x if $\log_a x + \log_a(x+4) = 0$
15. Consider the function $f(x)$ with graph below:



- a. What is $\lim_{x \rightarrow 3} f(x)$?
- b. Is $f(x)$ continuous at $x = 1$?
- c. Is $f(x)$ continuous at $x = 3$?

Find the following limits:

16. $\lim_{x \rightarrow 2} \frac{3x + 5}{5x - 3}$

17. $\lim_{x \rightarrow 0} \frac{\frac{1}{\sqrt{1+x}} - 1}{x}$

18. $\lim_{x \rightarrow 0} \frac{\sin 4x}{5x}$

19. $\lim_{x \rightarrow 1} \frac{x^3 - x^2}{x - 1}$

20. $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$

Determine the intervals on which the function is continuous:

21. $f(x) = \frac{3x^2 - x - 2}{x - 1}$

22. $f(x) = \begin{cases} 5 - x, & x \leq 2 \\ 2x - 3 & x > 2 \end{cases}$

Find the following limits:

23. $\lim_{x \rightarrow 0} \frac{\sin^2 x}{x}$

24. $\lim_{x \rightarrow +\infty} \frac{\sqrt{3x^4 + x}}{x^2 - 8}$

25. $\lim_{x \rightarrow +\infty} (\sqrt{x^2 - 5x} - x)$

26. $\lim_{x \rightarrow +\infty} \frac{1}{x^2 - 8}$

27. Show that $g(x) = \frac{x}{x+1}$ is equal to 0.599 for some value between 1 and 2.

28. Find the largest open interval, centered at $x = -1$ such that for all x in the interval the value of the function $f(x) = 7x + 5$ is within 0.01 of $f(-1) = -2$

29. Find the largest open interval, centered at $x = -1$ such that for all x in the interval the value of the function $f(x) = 7x + 5$ is within $\epsilon > 0$ of $f(-1) = -2$

Answers

1. $x \neq -\frac{10}{7}$
2. $x \leq -9$ or $x > 1$
3. $[-15, 2]$
4. $y = x + 5$
5. $(f \circ g)(x) = \frac{4\sqrt{3x}}{1+3x}$
6. $g \circ f(x+h) = \frac{1}{2x+3}$
7. $f(x) = \sqrt{x}$ and $g(x) = x^2 - 16$
8. $\sin \theta = \frac{1}{\sqrt{17}}$ and $\cos \theta = \frac{4}{\sqrt{17}}$
9. $-\sqrt{3}$
10. $-\frac{3}{\sqrt{34}}$
11. 5
12. -2
13. $\frac{4}{3}$
14. $-2 + \sqrt{5}$
15. a. 0
b. Yes
c. No
16. $\frac{11}{7}$
17. $-\frac{1}{2}$
18. $\frac{4}{5}$
19. 1
20. $\frac{1}{4}$
21. $(-\infty, 1) \cup (1, \infty)$
22. $(-\infty, 2) \cup (2, \infty)$
23. 0
24. $\sqrt{3}$
25. $-\frac{5}{2}$
26. 0

27. $g(1) = .5, g(2) = .666$ so by the I.V.T. there must be a c between 1 and 2 where $g(x) = 0.599$

28. $(-1 - \frac{0.01}{7}, -1 + \frac{0.01}{7})$

29. $(-1 - \frac{\epsilon}{7}, -1 + \frac{\epsilon}{7})$