

Sample Test I.

The actual test will have less questions. You will have 60 minutes to answer them, without using your notes or communicating with other students. You will have to give the simplest possible answer and show all your work.

1. Find the equation of the line passing through (2,3), slope -2 . Write your answer in slope-intercept form.

Answer: $y = -2x + 7$.

2. Find the equation of the line passing through (2,1) perpendicular to $2x - 5y = 1$. Write your answer in slope-intercept form.

Answer: $y = -5/2 \cdot x + 6$.

3. Find the radius and center of the circle whose equation is $x^2 - 4x + y^2 + 14y = 5$.

Answer: Center: (2, -7) Radius: $\sqrt{58}$

4. Find the domain of $\frac{1}{\sqrt[3]{x-2}}$.

Answer: $x \neq 2$.

5. Find the domain of $\frac{\sqrt{3-x}}{\sqrt{x-1}}$. Write your answer in interval notation.

Answer: (1, 3].

6. If $f(x) = x^2 + x + 1$ and $g(x) = \sqrt{x-1} + 1$, what is $f \circ g(x)$ and what is $(f/g)(x)$?

Answer: $f(g(x)) = (\sqrt{x-1} + 1)^2 + \sqrt{x-1} + 2$ and $(f/g)(x) = \frac{x^2 + x + 1}{\sqrt{x-1} + 1}$.

7. Find the (compositional) inverse of $f(x) = \frac{x}{3-2x}$

Answer: $f^{-1}(x) = \frac{3x}{2x+1}$

8. Find the (compositional) inverse of $f(x) = \frac{1}{\sqrt[3]{1-x}}$

Answer: $f^{-1}(x) = 1 - \frac{1}{x^3}$

9. A cell phone company charges a monthly fee of 10 and a per minute fee of 20 cents. Find the cost function.

Answer: $C(x) = 10 + 0.2x$

10. A second company enters the market and charges 31 dollars per month but only 5 cents per minute. At least how many minutes does Joe talk in a month if he finds this offer a better deal than the one in the previous question.

Answer: 140 minutes

11. What is the largest rectangular area you can enclose using 60 yards of fencing?

Answer: 225 square yards

12. What is the area function, and its domain associated to the previous question?

Answer: $A(x) = x \cdot (30 - x)$, the domain is $0 < x < 30$.

13. Find $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$

Answer: 12

14. Find $\lim_{x \rightarrow 0} \frac{1}{x}$

Answer: Does not exist

15. Find $\lim_{x \rightarrow 0^-} \frac{1}{x}$

Answer: $-\infty$

16. Find $\lim_{x \rightarrow \infty} \frac{2x^2 - 3x - 1}{1 - x^2}$

Answer: -2

17. Find $\lim_{x \rightarrow -\infty} \frac{2x^3 - 3x - 1}{1 - x^2}$

Answer: ∞

18. Find $\lim_{x \rightarrow \infty} \frac{2x^3 - 3x - 1}{1 - x^4}$

Answer: 0

19. Find the limit at 2 of the function

$$f(x) = \begin{cases} 1 - x & \text{if } x < 2 \\ 0 & \text{if } x = 2 \\ x^2 - 5 & \text{if } x > 2 \end{cases}$$

Is the function continuous at $x = 2$?

Answer: The limit is -1 . The function is not continuous at $x = 2$.

20. A function is not defined at $x = -1$. Could it still have a limit there? Could it be continuous there?

Answer: It could still have a limit there, but could not be continuous.

Good luck.

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