

Summer Assignment for Math 124 (Calculus I Part 2)

Name _____

MAKE SURE YOU READ THE INSTRUCTIOS FOR SUMMER ASSIGNMENTS.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the limit.

1) $\lim_{x \rightarrow 0} \frac{x^3 - 6x + 8}{x - 2}$

1) _____

2) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

2) _____

Provide an appropriate response.

3) It can be shown that the inequalities $-x \leq x \cos\left(\frac{1}{x}\right) \leq x$ hold for all values of $x \geq 0$.

3) _____

Find $\lim_{x \rightarrow 0} x \cos\left(\frac{1}{x}\right)$ if it exists.

4) The inequality $1 - \frac{x^2}{2} < \frac{\sin x}{x} < 1$ holds when x is measured in radians and $|x| < 1$.

4) _____

Find $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ if it exists.

Find the limit.

5) $\lim_{x \rightarrow 1^-} \frac{x^2 - 4x + 3}{x^3 - x}$

5) _____

6) $\lim_{x \rightarrow (-\pi/2)^-} \sec x$

6) _____

Divide numerator and denominator by the highest power of x in the denominator to find the limit.

7) $\lim_{x \rightarrow \infty} \sqrt{\frac{25x^2}{6 + 16x^2}}$

7) _____

8) $\lim_{x \rightarrow \infty} \frac{5x + 6}{\sqrt{6x^2 + 1}}$

8) _____

Provide an appropriate response.

9) Use the Intermediate Value Theorem to prove that $x(x - 2)^2 = 2$ has a solution between 1 and 3.

9) _____

Find numbers a and b, or k, so that f is continuous at every point.

10)
$$f(x) = \begin{cases} -7, & x < -4 \\ ax + b, & -4 \leq x \leq 3 \\ 21, & x > 3 \end{cases}$$

10) _____

11)
$$f(x) = \begin{cases} x^2, & \text{if } x \leq 2 \\ kx, & \text{if } x > 2 \end{cases}$$

11) _____

The function $s = f(t)$ gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

12) $s = 9t - t^2, 0 \leq t \leq 9$

Find the body's displacement and average velocity for the given time interval.

12) _____

Solve the problem.

13) At time t , the position of a body moving along the s -axis is $s = t^3 - 21t^2 + 120t$ m. Find the body's acceleration each time the velocity is zero. 13) _____

14) Suppose that the dollar cost of producing x radios is $c(x) = 200 + 10x - 0.2x^2$. Find the average cost per radio of producing the first 50 radios. 14) _____

Find dy/dt .

15) $y = \cos^4(\pi t - 17)$ 15) _____

16) $y = 5t(2t + 4)^4$ 16) _____

Use implicit differentiation to find dy/dx and d^2y/dx^2 .

17) $xy - x + y = 6$ 17) _____

At the given point, find the line that is normal to the curve at the given point.

18) $x^6y^6 = 64$, normal at $(2, 1)$ 18) _____

Find the derivative of y with respect to the independent variable.

19) $y = 2\sqrt{t}$ 19) _____

Find the indicated tangent line.

20) Find the tangent line to the graph of $f(x) = -8e^{5x}$ at the point $(0, -8)$. 20) _____

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

21) $y = (x + 10)^x$ 21) _____

Find the formula for df^{-1}/dx .

22) $f(x) = x^{5/3}$ 22) _____

Solve the problem.

23) A wheel with radius 3 m rolls at 15 rad/s. How fast is a point on the rim of the wheel rising when the point is $\pi/3$ radians above the horizontal (and rising)? (Round your answer to one decimal place.) 23) _____

24) A piece of land is shaped like a right triangle. Two people start at the right angle of the triangle at the same time, and walk at the same speed along different legs of the triangle. If the area formed by the positions of the two people and their starting point (the right angle) is changing at $2 \text{ m}^2/\text{s}$, then how fast are the people moving when they are 3 m from the right angle? (Round your answer to two decimal places.) 24) _____

Solve the problem. Round your answer, if appropriate.

25) Boyle's law states that if the temperature of a gas remains constant, then $PV = c$, where P = pressure, V = volume, and c is a constant. Given a quantity of gas at constant temperature, if V is decreasing at a rate of $15 \text{ in.}^3/\text{sec}$, at what rate is P increasing when $P = 40 \text{ lb/in.}^2$ and $V = 80 \text{ in.}^3$? (Do not round your answer.) 25) _____