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$$\frac{1-1}{1-1} = 0$$

$$\frac{\sin x}{2x}$$

$$\frac{\sin 0}{2 \cdot 0} = \frac{0}{0}$$

$$x^2 = 4$$

$$x = \sqrt{4}$$

$$x = 2$$

$$7(15) + 2c = 20$$

$$20 + 2c = 20$$

$$2c = -20$$

$$c = -10$$

$$7(15) + 2c = 20$$

$$105 + 2c = 20$$

$$2c = -85$$

$$c = -42.5$$

RT-I: Give a Short Answer [20%]

Instruction: Write the most simplified answer on the space provided.

1. Evaluate the following limits.

(a) $\lim_{x \rightarrow 1} \frac{x-1}{1-x^2} = \underline{0}$

(b) $\lim_{x \rightarrow 0} \frac{\sin 5x}{2x} = \underline{\quad\quad\quad}$

(c) $\lim_{x \rightarrow \infty} \left(\frac{x+1}{x-1}\right)^x = \underline{\quad\quad\quad}$

2. If $f(x) = \begin{cases} x^2 - c, & \text{for } x < 5 \\ 4x + 2c, & \text{for } x \geq 5 \end{cases}$ is continuous at $x = 5$ then, $c = \underline{\quad\quad\quad}$

3. The value of a and b for which the function $f(x) = x^3 + ax^2 + b$ will have relative extreme value at $(2, 3)$ is $\underline{\quad\quad\quad}$ and $\underline{\quad\quad\quad}$ respectively.

4. Let $f(x) = x \ln x$, then $(f)'(e^4) = \underline{\quad\quad\quad}$

5. The derivative of $g(x) = \int_1^{x^2} \sin t dt$ is $\underline{\quad\quad\quad}$

6. Evaluate;

(a) $\frac{d}{dx} \tan^{-1}(\tan \sqrt{x}) = \underline{\quad\quad\quad}$

(b) $\frac{d}{dx} \ln(\cosh x) = \underline{\quad\quad\quad}$

7. If $f(x) = \frac{x^3}{4} - 3x$, then the absolute maximum value and absolute minimum value of f on the closed interval $[0, 3]$ is $\underline{\quad\quad\quad}$ and $\underline{\quad\quad\quad}$ respectively.

8. Given $x^2 + 2xy + 2y^2 = 8$,

(a) $\frac{dy}{dx} = \underline{\quad\quad\quad}$

(b) The equation of the tangent line to the graph at $(0, 2)$ is $\underline{\quad\quad\quad}$

9. If $f(x) = e^{-3x}$, then the third derivative of f is $\underline{\quad\quad\quad}$

Top students

ART-II Workout[30%]

Show all the necessary steps clearly and neatly to answer the following questions.

1. Use ϵ - δ definition to show that $\lim_{x \rightarrow 3} (x^2 - 4x + 5) = 2$ (3pts)

Top students

PART-II Workout[30%]

Show all the necessary steps clearly and neatly to answer the following questions.

1. Use ϵ - δ definition to show that $\lim_{x \rightarrow 3} (x^2 - 4x + 5) = 2$ (3pts)

Top students

(e) the interval on which f is concave up and concave down, and the inflection point(s) of f if exist(s), (2 pts)

(f) Use the above information to sketch the graph of f . (1 pt)

Top students

3. Given the function $f(x) = \frac{x^2}{x^2-1}$. Then find;

(a) the domain, intercepts and critical numbers of f , (1 pt)

(b) the vertical and horizontal asymptotes of f , (1 pt)

(c) the intervals on which f is increasing and decreasing, (2 pts)

(d) the relative extreme value(s) of f if exist(s), (1 pt)

Top students

University (ASTU)

tural Science

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2. A water pours into a fish tank at a rate of $5 \frac{ft^3}{min}$. How fast the water level rising if the base of the tank is a square of the dimension $5 ft$? (3pts)