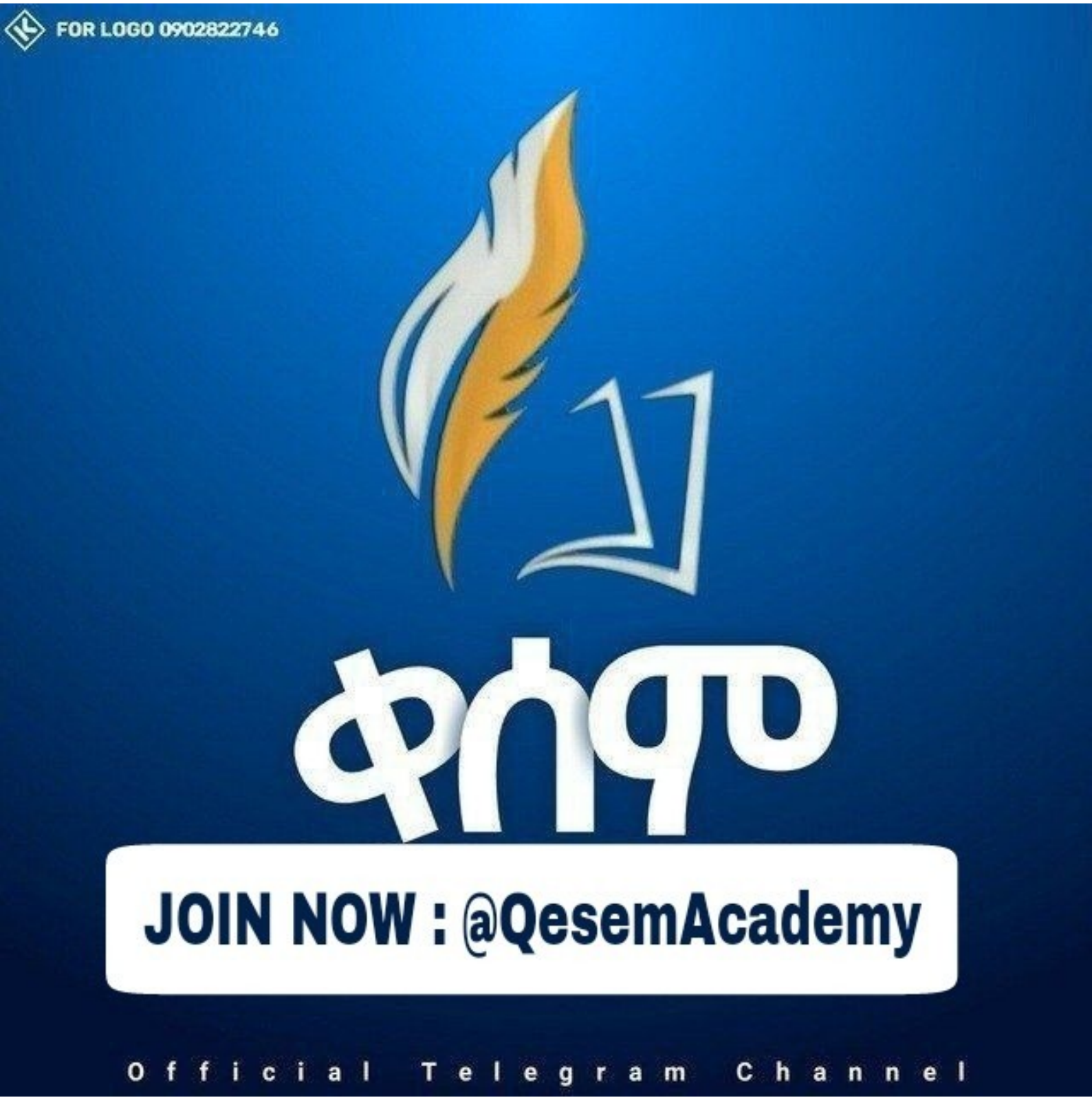
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$\frac{1-1}{1-1} = 0$ $x^2 = 1$ $f(1)+2c=0$
$\frac{\sin 5x}{2x}$ $x = \sqrt{1}$ $2(0)+2c=0$
$\frac{\sin 0}{2(0)} = \sin\frac{1}{0} =$ $2c=-0$
$f(\sqrt{1})+2c=0$
1 $c=-0$

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

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

1. Evaluate the following limits.
   (a) $\lim_{x\to 1} \frac{x-1}{1-x^2} =$ 0
   (b) $\lim_{x\to 0} \frac{\sin 5x}{2x} =$ _____
   (c) $\lim_{x\to\infty} (\frac{x+1}{x-1})^x =$ _____

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, $c =$ _____.

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 _____ and _____ respectively.

4. Let $f(x) = x \ln x$, then $(f)'(e^4) =$ _____.

5. The derivative of $g(x) = \int_1^{x^2} sintdt$ is _____.

6. Evaluate;
   (a) $\frac{d}{dx} tan^{-1}(tan\sqrt{x}) =$ _____.
   (b) $\frac{d}{dx} \ln(coshx) =$ _____.

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 _____ and _____ respectively.

8. Given $x^2 + 2xy + 2y^2 = 8$,
   (a) $\frac{dy}{dx} =$ _____
   (b) The equation of the tangent line to the graph at(0,2) is _____.

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

ART-II Workout[30%]

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

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

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)

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)

(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)