

**QUESTION 4:**

(3 Marks)

- a) Discuss the Continuity of the function  $f(x) = \begin{cases} \frac{1 - \cos x}{x \sin x}, & x \neq 0 \\ 2, & x = 0 \end{cases}$  at  $x = 0$

- b) Find an equation of the line tangent to the graph of  $y = 3x^2 - 1$  at  $x = 1$

**QUESTION 5:**

(3 Marks)

- a) Write the value of  $\lim_{h \rightarrow 0} \frac{(1+h)^5 - 1}{h}$ , using the derivative notation.

- b) Suppose that  $\frac{d}{dx} \left[ f\left(\frac{1}{2}x\right) \right] = 2x$ , where  $f(x)$  is differentiable function on  $(-\infty, \infty)$ .

Find  $\frac{d}{dx} [f(x)]$ .

**QUESTION 6:**

(9 Marks)

- a) Find  $\frac{dy}{dx}$  for each of the following:

1)  $y = 2x^5 - 7$

2)  $y = (2x^2 + 3x)^7$

3)  $y = \sqrt{x^2 + 4x} + x^{\frac{2}{3}}$

4)  $y = \frac{x^2}{2x + 6}$

5)  $y = (x^2 + 3)(4x - 2)$

- b) Find  $f''(x)$  for  $f(x) = x^4 + x^{-2}$

*Good Luck*



Time allowed : 2 Hours

St. Name:

Section:

St. ID:

ملاحظة: - أكتب خطوات الحل بالتفصيل لجميع الأسئلة داخل دفتر الإجابة  
- أي إجابة لسؤال أو فرع من الأسئلة على ورقة الأسئلة لا تعتمد.

This Exam consists of (6) essay questions pointed in two pages of (30) marks.

**QUESTION 1:**

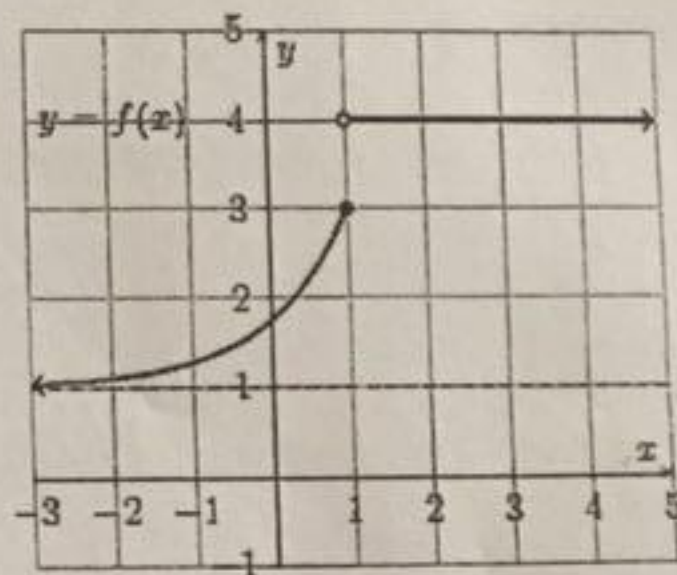
(3 Mark)

Use the graph of  $y = f(x)$  to find the following:

a)  $\lim_{x \rightarrow 1} f(x)$

b)  $f(1)$

c) The horizontal asymptote(s) for the graph of  $f(x)$ .



**QUESTION 2:**

(9 Marks)

Evaluate each of the following limits (if exist).

a)  $\lim_{x \rightarrow 1} (2x^3 - 3x^2 - 4)$

b)  $\lim_{x \rightarrow 0} \frac{\sin 5x + \tan 3x}{4x}$

c)  $\lim_{x \rightarrow 1} \frac{x^2 - x}{x - 1}$

d)  $\lim_{x \rightarrow \infty} \frac{3x^2 - x^3 + 4}{2x^2 - 3}$

e)  $\lim_{x \rightarrow 2} \frac{\sqrt{4-x} - \sqrt{x}}{2-x}$

f)  $\lim_{x \rightarrow 0} \left[ x^2 \cos\left(x + \frac{1}{x}\right) \right]$

(3 Marks)

**QUESTION 3:**

a) Let  $\lim_{x \rightarrow 2} f(x) = 4$  and  $\lim_{x \rightarrow 2} g(x) = -3$ . Find  $\lim_{x \rightarrow 2} \left[ 3f(x) + \frac{6}{g(x)} \right]$ .

b) Find the vertical asymptote(s) of  $f(x) = \frac{4x^2 - 2}{3x - 6}$  (if any).