

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:

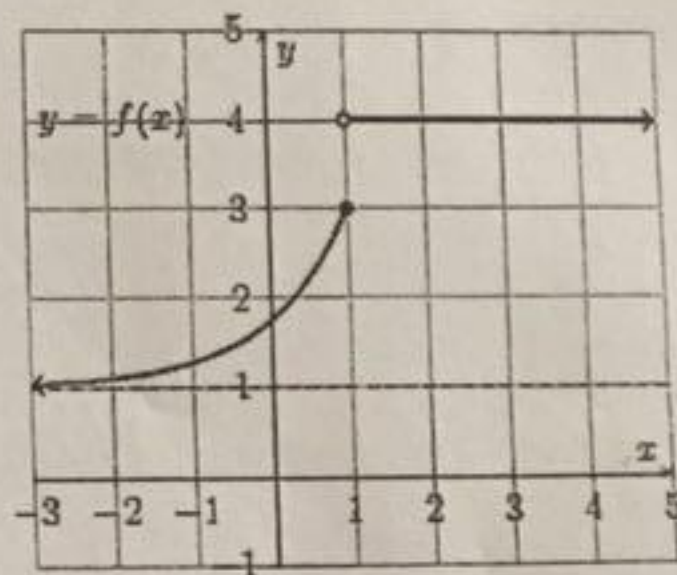
(3 Mark)

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).