

**The Islamic University Of Gaza**  
**Department of Mathematics**  
**Calculus A (MathA1401)**

**Date: 27/5/2007**

**Final Exam**

**Time: Two Hours**

	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Total
	18	14	14	15	15	24	100

**Answer the following questions:**

**Q.1 (a)** Find  $\frac{dy}{dx}$  if  $y = (x + \csc x)^{-3/5} + \cot(2x^3 + 3x + 1)$ .

**(b)** Find  $\frac{dy}{dx}$  if  $y^3 + \sin^2\left(\frac{1}{x}\right) = xy + 1$ .

**(c)** Find  $\frac{dy}{dx}$  if  $y = \int_0^{\tan x} \frac{dt}{\sqrt{1-t^2}}$ .

**Q.2 (a)** Find  $\lim_{x \rightarrow 4^-} \frac{x - 4}{\sqrt{x^2 - 8x + 16}}$

**(b)** Let  $f(x)$  be an odd function and let  $g(x) = |x|f(x)$ . Determine whether  $g(x)$  is even, odd, or neither.

**Q.3** (a) Find the linearization of  $f(x) = \sin x$  at  $x = \pi$  and use it to find an approximation of  $f(3)$ .

(b) Use the mean value theorem to prove that  $|\cos b - \cos a| \leq |b - a|$ .

**Q.4** Evaluate the following integrals

(a)  $\int x^2 \cos(x^3 + 1) dx$

(b)  $\int_{-3}^0 \frac{x}{\sqrt{1-x}} dx$

**Q.5 (a)** If  $\int_0^5 f(x)dx = 3$  and  $\int_0^8 f(x)dx = 10$ , then find the value of  $\int_5^8 [3f(x) - 5]dx$ .

**(b)** Find the area of the region enclosed by the curve  $y = x^2 + 1$  and the line  $y = x + 3$ .

**Q.6** Let  $f(x) = \frac{x^2 + 3}{x - 1}$ .

(a) Find the domain and the range of  $f(x)$ .

(b) Find the intervals on which  $f(x)$  is decreasing and increasing.

(c) Find the intervals on which  $f(x)$  is concave up and concave down. concave up, and concave down.

(d) Find the location of all extreme values and inflection points of  $f(x)$ , if they exist.

(e) Find all the asymptotes of  $f(x)$ .

(f) Graph  $y = f(x)$ .