

Islamic University Of Gaza
Department of Mathematics
Calculus A (Math A1301)



Final Exam
Date: 24/12/2016
Time: Two Hours

إسم الطالب :	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Total
الرقم الجامعي :							
المدرس :	14	16	14	20	16	20	100

Answer the following questions:

Q.1 (a) Evaluate $\lim_{x \rightarrow -2} \frac{x^2 + 5x + 6}{x^2 + x - 2}$.

(b) Find $\frac{dy}{dx}$ if $y = \int_0^{\sqrt{x}} \frac{1}{t^6 + 1} dt$.

Q.2 (a) Find equations for the tangent and normal lines to the curve $x^3y^3 + y^2 = x + y$ at the point $(1, 1)$.

(b) Find $\frac{d^2y}{dx^2}$ if $y = \tan^2 x$.

Q.3 Evaluate the following integrals:

(a) $\int x^2 \sqrt{2-x} \, dx$

(b) $\int \cos x \sin(\sin x) \, dx$

Q.4 Let $f(x) = \frac{x^2 - 8}{x + 3}$.

(a) Find the domain of the function f .

(b) Find all asymptotes of the graph of f .

(c) Find the intervals on which the function f is increasing and decreasing.

(d) Find the local extreme values of f .

(e) Find the inflection points of f and find the intervals on which the graph of f is concave up and concave down.

(f) Find the x -intercepts and the y -intercepts, and sketch the graph of f .

Q.5 (a) Find the area of the region bounded by the curve $y = \sqrt{x+4}$, the line $y = x - 2$, and the x axis.

(b) Find the volume of the solid generated by revolving the region in the first quadrant bounded by the parabola $x = y^2$, the line $x = 9$ and the x axis, about the line $x = 9$.

Q.6 Choose the correct answer for each of the following:

- (i) The length L of the curve $y = f(x)$ from $x = 1$ to $x = 4$ is given by
- (a) $L = \int_1^4 \sqrt{f'(x) + 1} \, dx$ (b) $L = \int_1^4 \sqrt{[f'(x)]^2 + 1} \, dx$
(c) $L = \int_1^4 f(x) \sqrt{[f'(x)]^2 + 1} \, dx$ (d) $L = 2\pi \int_1^4 f(x) \sqrt{[f'(x)]^2 + 1} \, dx$
- (ii) If $f(1) = 2$ and $f'(1) = 3$, then the linearization of $f(x)$ at $x = 1$ is
(a) $L(x) = 3x - 1$ (b) $L(x) = 2x + 1$ (c) $L(x) = -3x + 1$ (d) $L(x) = 3x + 1$
- (iii) If $f(x) = |x - 2|$, then $f(x)$ is **NOT** differentiable at
(a) $x = 0$ (b) $x = -2$ (c) $x = 2$ (d) $x = 1$
- (iv) The period of the function $f(x) = \cot\left(2x - \frac{\pi}{2}\right)$ is
(a) $\frac{\pi}{2}$ (b) π (c) $\frac{3\pi}{2}$ (d) 2π
- (v) The range of $f(x) = 2 + \sin x$ is
(a) $[-1, 1]$ (b) $[-1, 2]$ (c) $[1, 2]$ (d) $[1, 3]$
- (vi) The graph of $f(x) = (x - 2)^2 + 3$ can be obtained by shifting the graph of $g(x) = x^2$
(a) 2 units up and 3 units down (b) 2 units to the right and 3 units up
(c) 2 units to the left and 3 units up (d) 2 units down and 3 units to the left
- (vii) The function $f(x) = \frac{\sin x}{x}$ is continuous on the set
(a) $\mathbb{R}$ (b) $\mathbb{R} - \{\pi\}$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R} - \{0\}$
- (viii) Let $f(x)$ be a continuous function on an interval $[0, 1]$. If $f(0) = 6$ and $f(1) = 4$, then there is a number $c \in [0, 1]$ such that
(a) $f'(c) = 0$ (b) $f'(c) = 5$ (c) $f(c) = 0$ (d) $f(c) = 5$
- (ix) Let $f(x)$ be differentiable function on an interval $[a, b]$. If $f(a) = 7$ and $f(b) = 1$, and $f'(x) \neq 0$ for all $x \in (a, b)$, then the absolute maximum value of $f(x)$ on $[a, b]$ is
(a) 7 (b) 1
(c) $f(c)$ for some $c \in (a, b)$ (d) None of the above
- (x) If $f(x)$ is an odd function, then $g(x) = xf(\sin x)$ is
(a) odd (b) even (c) neither even nor odd (d) both even and odd