



Islamic University of Gaza
Department of Math.
First Semester 27 /8/2019

Calculus B
Final Exam
Time: 2hours

	الاسم	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total
	الرقم								
	المدرس	14	12	14	12	10	14	24	100

Solve the following questions:

[Q1] Find y' for the following functions

(a) $y = x \cos^{-1} x - \sqrt{1-x^2}.$

(b) $y = x^2 \tanh(5^x) + \sinh^{-1}(\ln(\sec(x))).$

(c) $y = \frac{\csc x \sqrt{x^3 - \cos x}}{(x+2)^3}.$

[Q2] Evaluate the following integrals:-

(a) $\int \frac{x^{\ln x} \ln x}{x} dx$

(b) $\int_0^2 \frac{dx}{\sqrt{4-x^2}}$

[Q3] (a) Discuss the convergence of the improper integral $\int_1^{\infty} \frac{x^2}{\sqrt{x^7 + 3}} dx$.

(b) Find the following limits

(i) $\lim_{x \rightarrow 0} (\csc x - \cot x)$

(ii) $\lim_{x \rightarrow \infty} (x^3 + e)^{\frac{1}{\ln x}}$

[Q4] Test the convergence of the following series

a) $\sum_{n=1}^{\infty} \frac{\tan^{-1} n}{n^3 + 1}$

b) $\sum_{n=1}^{\infty} (-1)^n \frac{2n}{3n + 2}$

[Q5] Find the interval and radius of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{(x+2)^n}{n 3^n}$$

[Q6](a) Find the Taylor polynomial $P_4(x)$ of the function $f(x) = \sin x$ about

$$x = \frac{\pi}{2}.$$

(b) Find the vertices, foci, center and asymptotes of the conic section

$$y^2 - 4x^2 + 16x - 24 = 0$$

[Q7](a) Sketch the graph of $r = 2 - 2 \cos \theta$. (Don't discuss the symmetry)

(b) Find an equation of the ellipse with foci (1,2) and (-3,2) and major axis of length 8. Find its center and vertices.

(c) Consider the curve $x = \frac{t^2}{2}, y = \frac{1}{3}(2t + 1)^{\frac{3}{2}}, 2 \leq t \leq 7$.

(i) Find an equation for the tangent line to the curve at $t = 4$.

(ii) Find the length of the curve.

(d) Find a polar equation of the circle $(x + 1)^2 + (y - 3)^2 = 16$

Good Luck