



Islamic University of Gaza
Department of Math.
Summer Semester, 28 /8/2017

Calculus B
Final Exam
Time: two hours

	الاسم	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total
	الرقم	18	18	10	12	12	14	16	100
	المدرس								

Solve the following questions:

[Q1] (a) [٦ Marks] Find y' if. $y = (\sec x)^{\tan^{-1}x} + \operatorname{sech}^{-1}(e^x - 1)$

(b) [6 Marks] Evaluate $\lim_{x \rightarrow 0} \frac{2^{\sin x} - 1}{e^x - 1}$.

[c][6 Marks] Let $f(x) = \ln x + \ln(x + 1)$

Show that $f(x)$ is one-to-one on $(0, \infty)$ and find $\left. \frac{df^{-1}}{dx} \right|_{x=f(1)}$.

[Q2] Evaluate the following integrals:-

(a)[6 Marks] $\int \sqrt{49 - x^2} \, dx$.

(b) [6 Marks] $\int_0^\pi \sqrt{\frac{1 + \cos x}{2}} \, dx$.

(c)[6 Marks] $\int x \tan^{-1} x \, dx$.

[Q3] (a) [6 Marks] Find the tangent line to the curve $x = \cos t, y = \sin t$, at $t = \frac{\pi}{3}$

(b) [4 Marks] Find the Cartesian equation of the following polar equation
 $r = \sec \theta (\ln r + \ln \sin \theta)$.

[Q4] Test the convergence for the following series:-

(a) [6 Marks] $\sum_{n=1}^{\infty} \frac{n! \sqrt{n}}{(n+1)!} \cdot$

(b) [6 Marks] $\sum_{n=2}^{\infty} \frac{1}{n (\ln n)^2} \cdot$

[Q5] [12 Marks] Find the interval and radius of convergence for the following

power series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}(x+1)^n}{3^n n}$.

[Q6](a) [6 Marks] Find the Maclaurin polynomial of degree 4 for the function $f(x) = \ln(x + 1)$.

(b) [8 Marks] Graph the Cardioid $r = 1 + \cos \theta$, then find its length.

[Q7](a) [8 Marks] Find the center, foci, vertices, asymptotes of the following conic section, then sketch it

$$y^2 - x^2 + 4y - 6x = 6.$$

(b) [8 Marks] Let $r = \frac{12}{3 - \sin \theta}$ be a conic section with focus at the origin.

Identify the conic section, and find the directrix corresponding to the focus at the origin. Label the center, vertices and the other focus.

Good Luck