Zagazig University- Banha Branch
Faculty of Engineering- Shoubra
Nat. and Math. Sci. Department

1st Year: Elec. Engineering
Mathematics A
Date: 15/1/ 2003

	Answer the following questions: Time: 3 Hours
1	(a)Test the series: (i) $\sum_{n=1}^{\infty} \frac{n}{n+2^n}$ (ii) $\sum_{n=1}^{\infty} (-1)^n \frac{\sin n}{n^2}$ (b)Find the interval of convergence of the series: $\sum_{n=1}^{\infty} n\left(\frac{x-1}{2}\right)^n$ (c)Show that the envelope of the curves: $x\cos\alpha + y\sin\alpha = 4$ is the circle: $x^2+y^2=16$
2	(a)Find the extrema of the function: f(x,y) = $x^2+2y^2-2x+8y+4$ (b)Show that the orthogonal trajectories of the circles: $x^2+(y-a)^2=a^2$ are the circles $(x-b)^2+y^2=b^2$ (c)Solve the equation: $(e^x + y\sin x)dx + (2y-\cos x)y = 0$
3	Solve the differential equations: (a) y`+ 2xy = 4x (b) y``+ y $=3\sin 2x + x^2$ (c) $(x^2D^2 - 2xD - 4)y = x^4 + 4$
4	(a)Prove that: If f(x,y,z) is a function, then curl grad f $=\overline{0}$. (b)Verify Stoke's theorem for the vector: $\overline{U} = 2yi + 3xj - z^2k$ through the semi-sphere $x^2+y^2+z^2=9,\ z \ge 0$
5	(a)Find the sum of the series: $\sin\theta + \sin 2\theta + \sin 3\theta + \ldots$ (b)Find the bilinear transformation that maps the three points: -1, i, 1 in z-plane onto the three points 0, i, ∞ in w-plane. (c)Evaluate the integrals: (i) $\int_C \frac{5z^2}{(z-3)(z-8)}dz$ (ii) $\int_C \frac{e^z}{(z^2-7z+6)^2}dz$ where C is the ellipse |z – 4| +|z + 4| = 10

Good Luck

Dr. M.H. Eid