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

2nd Year: Civil Engineering
Mathematics
Date: 14/1/ 2003

	Answer the following questions: Time: 3 Hours
1	Solve the following P.D.E: (a) $3u_x + 4u_y - 5u = 25y$ (b) $3u_{xx} - 4u_{xy} + u_{yy} + u_x + u_y - 12u = 0$ (c) $u_{tt} - 4u_{xx} = 0, \quad 0 < x < 1$ B.C $u(0,t) = u(1,t) = 0$ I.C $u(x,0) = x - 1, \ u_t(x,0) = x + 1.$
2	Solve the LP problems: (a)Minimize $f = x - y - z + 5$ s.t $2x - y + z \le 4$ $x + 2y + 2z \le 10$ $-x + y - z \le 8$ $x, y, z \ge 0.$ (b)Maximize $f = x + 2y + 3z$ s.t $x + y + z \le 18$ $2x + 3y - z \ge 16$ $2x - y + 2z \ge 12$ $X, y, z \ge 0.$
3	(a)Find the exponential curve that fits the points: (1, 2), (2, 3), (3, 2.5), (4, 3.8), (5, 6). (b)Evaluate the integral: $\int_1^{\infty} \frac{e^{1/x}}{x^2+1} dx$ by Simpson's rule, $\Delta = 0.1$
4	(a)Solve the system of equations, number of iterations is 3: $\begin{bmatrix} 2 & -1 & 2 & -1 \\ 1 & 2 & -1 & -1 \\ 1 & -2 & 2 & 1 \\ 1 & 1 & -1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 2 \\ -2 \\ 7 \\ 8 \end{bmatrix}$ (b)Find a root to the equation $f(x) = x^4 - x - 1 = 0$ in [1,2], using the bisection method and number of iterations is 5.
5	(a)Find u and v of the function f(z) = sinz cosz and show that they satisfy Riemman equations. (b)Find the sum of the series: $1 + \cos\theta + \cos 2\theta + \ldots$ (c)Evaluate the following integrals: (i) $\int_C \frac{\ln(2z+15)}{z^2-36} dz$ (ii) $\int_C \frac{z e^z}{z+\pi i} dz$ (iii) $\int_C \frac{z e^z}{(z-1)^2} dz$ where C is the ellipse $\lvert z - 3\rvert + \lvert z + 3\rvert = 10$.

Good Luck Dr. M.H. Eid

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

2^{nd} Year: Civil Engineering
Mathematics
Date: 26/12/ 2002

	Answer the following questions: Time: 3 Hours
1	Solve the following P.D.E: (a) $u_x + u_y - 4\sqrt{2}\,u = 8$ (b) $6u_{xx} - 5u_{xy} + u_{yy} - u_x + 2u_y - 15u = 0$ (c) $u_{tt} - 9u_{xx} = 0, \quad 0 < x < 1$ B.C $u(0,t) = u(1,t) = 0$ I.C $u(x,0) = x$, $u_t(x,0) = x - 1$
2	Solve the LP problems: (a)Maximize $f = x + 3y + 2z$ s.t $x + 2y + z \le 10$ $x - y + z \le 8$ $x, y, z \ge 0$ (b)Maximize $f = 2x + y + z$ s.t $x - y + 2z \le 3$ $x + 2y - z \le 4$ $x - 2y + 3z \ge 4$ $x, y, z \ge 0$
3	(a)Find the least squares line that fits the points: (0, 0), (1, 2), (2, 3), (3, 5), (4, 8), (5, 9). (b)Find the value of y at x = 2 from the data: (1, 3), (3, 6), (5, 12), (7, 15).
4	(a)Evaluate the integral: $\int_1^3 \frac{\ln(x+2)}{x+1}dx$ by Simpson's rule, $\Delta = 0.25$ (b)Find the Lagrange's polynomial that satisfies the data: (0, 1), (1, 2), (2, 7), (3, 22).
5	(a)Show that the function u(x,y) = 2xy + 2y is harmonic and find its conjugate v(x,y) such that the function w = u + iv is analytic. (b)Evaluate the following integrals: (i) $\int_C \frac{z e^z}{z+6}dz$ (ii) $\int_C \frac{\ln(2z+11)}{z-3}dz$ (iii) $\int_C \frac{e^{-3z}}{z^3}dz$ where C is the circle $\lvert z - 1\rvert = 4$.

Good Luck

Dr. M.H. Eid