Faculty of Engineering- ShoubraMathematicsNat. and Math. Sci. DepartmentJanuary 2002Answer the following questions:Time: 3 Hours1Solve the following P.D.E:(a) $u_x - 2u_y - u = 0$ , $u(0, y) = 3e^{2y}$ (b) $9u_{xx} - 6u_{xy} + u_{yy} + u_x - u_y + 2u = 0$ (c) $u_{tt} - 4u_{xx} = 0$ , $0 < x < 1$ B.C $u(0,t) = u(1,t) = 0$ I.C $u(x,0) = x + 1$ , $u_t(x,0) = x$ .2Solve the LP problem:Maximize $f = 3x + y + 4z$ $s.t$ $x + y + 2z \le 18$ $2x + 3y + 2z = 18$ $x + 2y + 2z \ge 6$ , $x, y, z \ge 0$ .3(a)Find the exponential curve that fits the points: $(0.2, 1.4), (0.4, 2), (0.6, 2.5), (0.8, 3.2), (1, 3.6).$ (b)Using the inverse interpolation, find a root to the equation: $x^4 + x - 1 = 0$ in the interval $[0.6, 0.9]$ .4(a)Using Taylor's method, solve the differential equation: $y^ xy^2 - y = 0, y(1) = 1.$ (b)Solve the system of equations: $2x + y + z = 4$ $x + 3y - 3z = 1$ $x + y + 3z = 5$ 5(a)Show that the function $u(x,y) = 2x + e^x \cos y$ is harmonic and find its conjugate function $y(x, y)$ such that the function $y = u + iy$	Za	gazig University- Banha Branch	2 <sup>nd</sup> Year: Civil Engineering
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is analytic		is analytic	Such that the function $w = u + iv$
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(b)Evaluate the following integrals. b(z + z) and $z = z = z = z$		(0)Evaluate the following integral	
(i) $\int \frac{\cos z}{2z - 13} dz$ (ii) $\int \frac{\ln(z + e)}{z} dz$ (iii) $\int \frac{\cos z}{(z - \pi)^3} dz$		(i) $\int \frac{\cos z}{2z - 13} dz$ (ii) $\int \frac{\ln(z - z)}{z}$	$\int \frac{\cos z}{C(z-\pi)^3} dz$
where C is the ellipse $ z - 3  +  z + 1  = 6$ .		where C is the ellipse $ z - 3  +  z $	+ 1  = 6.
Good Luck Dr. M.H. Eid			