MATH 206
Dr. Bogacki

QUIZ 7
ANSWER KEY

Summer 2001

1. Given the curve $y = \ln x \quad 1 \le x \le e$, find the integrals (without evaluating) that correspond to:

   (a) the arc length of the curve $\int_1^e \sqrt{1+(1/x)^2}\, dx$

   (b) area of the surface obtained by rotating the curve about the *x*-axis
   $2\pi \int_1^e \ln x \sqrt{1+(1/x)^2}\, dx$

   (c) area of the surface obtained by rotating the curve about the *y*-axis
   $2\pi \int_1^e x \sqrt{1+(1/x)^2}\, dx$

   (d) area of the surface obtained by rotating the curve about the line $x = e$
   $2\pi \int_1^e (e-x) \sqrt{1+(1/x)^2}\, dx$

   (e) area of the surface obtained by rotating the curve about the line $y = -2$
   $2\pi \int_1^e (\ln x + 2) \sqrt{1+(1/x)^2}\, dx$

2. Given the function $z = x^2 + xy^2$, find

   (a) $\frac{\partial z}{\partial x} = 2x + y^2$

   (b) $\frac{\partial z}{\partial y} = 2xy$

   (c) $\frac{\partial^2 z}{\partial x^2} = \frac{\partial}{\partial x}\left(\frac{\partial z}{\partial x}\right) = \frac{\partial}{\partial x}(2x+y^2) = 2$

   (d) $\frac{\partial^2 z}{\partial y^2} = \frac{\partial}{\partial y}\left(\frac{\partial z}{\partial y}\right) = \frac{\partial}{\partial y}(2xy) = 2x$

   (e) $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial}{\partial x}\left(\frac{\partial z}{\partial y}\right) = \frac{\partial}{\partial x}(2xy) = 2y$