MATH 224

Selected Hints and Answers for Assignment 7

Chapter 3: 24 abc, 25abc, 26ac, 27 and 29.

24abc: Find f_x and f_y or each of the following:
a: $f_x(x,y) = y\cos xy, f_y(x,y) = x\cos xy$
b: The derivative of $\tan x$ is $\sec^2 x$ and the derivative of e^x is e^x.
$f_x(x,y) = \frac{e^x}{(\cos^2 e^x)}$ and $f_y(x,y)$ is then 0.
c: The derivative of $\arctan x$ is $\frac{1}{1+x^2}$. $f_x(x,y) = (\arctan y)(-x^{-2}), f_y(x,y) = (\frac{1}{x})\frac{1}{1+y^2}$.

25. Use result of Exercise 24a, the Chain Rule and Product Rule:

$$f_{xx}(x,y) = -y^2\cos xy, f_{yy}(x,y) = -x^2\sin(yx)$$
$$f_{xy}(x,y) = f_{yx} = \cos yx - yx\sin yx$$

b) $f_{xy} = f_{yx} = 0$ and

$$f_{xx}(x,y) = \frac{e^x(2e^x\sin e^x + \cos e^x)}{\cos^3 e^x}$$

c) Here $f_{xx}(x,y) = 2\arctan y(x^{-3})$, $f_{xy}(x,y) = (\frac{1}{y^2+1})(-x^{-2})$, $f_{yx}(x,y) = (\frac{1}{y^2+1})(-x^{-2})$, and $f_{yy}(x,y) = (\frac{1}{x})\frac{-2y}{(y^2+1)^2}$.

26ac (a) $f_x(2,3) = 24$ and $f_y(2,3) = 2$
(c) $f_x(2,3) = \frac{13}{48}$ and$f_y(2,3) = \frac{-13}{72}$

27: $U_x(4,4)3024, U_y(4,4) = 5292$.