AMS/ECON 11B Quiz 4 – Solutions November 9, 2015

Compute the indicated partial derivatives of the functions below.

1. $f(x,y) = (x^2+4y)\sqrt{3x+2y^2}$

(a) (2 pts) $f_x = 2x\sqrt{3x+2y^2} + (x^2+4y)\cdot\dfrac{1}{2}(3x+2y^2)^{-1/2}\cdot 3$

clean up: $= 2x\sqrt{3x+2y^2} + \dfrac{3}{2}(x^2+4y)(3x+2y^2)^{-1/2}$ $\left(= \dfrac{15x^2+8xy^2+12y}{2\sqrt{3x+2y^2}}\right)$

(b) (2 pts) $f_y = 4\sqrt{3x+2y^2} + (x^2+4y)\cdot\dfrac{1}{2}(3x+2y^2)^{-1/2}\cdot 4y$

clean up: $= 4\sqrt{3x+2y^2} + 2y(x^2+4y)(3x+2y^2)^{-1/2}$ $\left(= \dfrac{12x+2x^2y+16y^2}{\sqrt{3x+2y^2}}\right)$

2. $w = \ln(3u^2+2v^5)$

(a) (2 pts) $\dfrac{\partial w}{\partial u} = \dfrac{6u}{3u^2+2v^5}$

(b) (2 pts) $\dfrac{\partial w}{\partial v} = \dfrac{10v^4}{3u^2+2v^5}$

(c) (2 pts) $\dfrac{\partial^2 w}{\partial v\partial u} = \dfrac{\partial}{\partial v}\left(\dfrac{6u}{3u^2+2v^5}\right) = -\dfrac{60uv^4}{(3u^2+2v^5)^2}$ $\left(= \dfrac{\partial}{\partial u}\left(\dfrac{10v^4}{3u^2+2v^5}\right)\right)$