Homework Day 5 - ECON 186

Problem 1. Chiang and Wainwright 7.4 #2(a, c), 7

#2 Find f_x and f_y from the following:
(a)$f(x, y) = x^2 + 5xy - y^3$ (c) $f(x, y) = \frac{2x-3y}{x+y}$
#7 Write the gradients of the following functions:
(a)$f(x, y, z) = x^2 + y^3 + z^4$
(b)$f(x, y, z) = xyz$

Problem 2. Chiang and Wainwright 7.6 #1

#1 Use Jacobian determinants to test the existence of functional dependence between:
(a)

$$\begin{aligned} y_1 &= 3x_1^2 + x_2 \\ y_2 &= 9x_1^4 + 6x_1^2(x_2 + 4) + x_2(x_2 + 8) + 12 \end{aligned}$$

(b)

$$\begin{aligned} y_1 &= 3x_1^2 + 2x_2^2 \\ y_2 &= 5x_1 + 1 \end{aligned}$$

Problem 3. Chiang and Wainwright 8.1 #6

#6 Given $Q = 100 - 2P + 0.02Y$, where Q is quantity demanded, P is price,and Y is income, and given $P = 20$ and $Y = 5000$, find the
(a)Price elasticity of demand.
(b)Income elasticity ofdemand.

Problem 4. Chiang and Wainwright 8.2 #7(a)

#7 Find the total differential for each of the following functions:
(a)$U = -5x^3 - 12xy - 6y^5$

Problem 5. Chiang and Wainwright 8.3 #2

#2
Use the rules of differentials to find dy from the following functions:
(a) $y = \frac{x_1}{x_1+x_2}$ (b)$y = \frac{2x_1x_2}{x_1+x_2}$
Check your answers against those obtained for Exercise 8.2-3(see below).
Exercise 8.2, #3
Find the total differentia, given
(a) $y = \frac{x_1}{x_1+x_2}$ (b)$y = \frac{2x_1x_2}{x_1+x_2}$

Problem 6. Chiang and Wainwright 8.4 #1

#1 Find the total derivative dz/dy, given
(a)$z = f(x, y) = 5x + xy - y^2$, where $x = g(y) = 3y^2$
(b)$z = 4x^2 - 3xy + 2y^2$, where $x = 1/y$
(c)$z = (x + y)(x - 2y)$, where $x = 2 - 7y$

Problem 7. Chiang and Wainwright 8.5 #2(a, c), 6

#2 For each $F(x, y) = 0$ use the implicit-function rule to find dy/dx:
(a)$F(x, y) = 3x^2 + 2xy + 4y^3 = 0$
(c)$F(x, y) = 7x^2 + 2xy^2 + 9y^4 = 0$
#6 Given $x^2 + 3xy + 2yz + y^2 + z^2 - 11 = 0$, is an implicit function $z = f(x, y)$ defined around the point $(x = 1, y = 2, z = 0)$? If so, find $\partial z/\partial x$ and $\partial z/\partial y$ by the implicit function rule, and evaluate them at that point.