Weekly Homework 2

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Deterministic Calculus & Unconstrained Optimizations
Due December 3, 2012

Exercise 1. (4 points) Find the domain of the following functions of one variable:

$$1) \quad f(x) = \frac{\sqrt[2]{x+5}}{log(x+3)}$$
$$2) \quad f(x) = \left(\frac{2}{x+3}\right)^{3x}$$

Exercise 2. (4 points)Find the differentials of the following functions of one variable:

$$1) \quad f(x) = (x-8)(7x+5)$$
$$2) \quad f(x) = \frac{x}{x^2+1}$$

Exercise 3. (4 points) Expand the following functions of one variable up to the 4th order around the point x_0:

$$1) \quad f(x) = \frac{1}{1+x} \qquad x_0 = 1$$
$$2) \quad f(x) = \frac{1}{1+x} \qquad x_0 = -2$$

Exercise 4. (4 points) Find the domain of the following functions of two variables:

$$1) \quad f(x,y) = \sqrt[2]{\frac{x}{y}}$$
$$2) \quad f(x,y) = log(x+y)$$

Exercise 5. (4 points) Find the differentials of the following functions of two variables:

$$1) \quad f(x,y) = 2x + 9xy + y^2$$
$$2) \quad f(x,y) = \frac{x}{x+y}$$

Exercise 6. (5 points) Expand the following functions of two variables up to the 2th order around the point x_0:

$$1) \quad f(x,y) = ln\left(1+\frac{x}{y}\right) \qquad x_0 = (1,1)$$

Exercise 7. (5 points) Find the maxima and/or minima of the following function:

$$1) \quad f(x_1, x_2) = (x_1^2 - 1)(x_2 + 1)$$