Math 421-001 | **Review of Chapter 11** | **Spring, 2015**

Review of Chapter 11

I. The following are important concepts from Chapter 11. You should be able to state the definitions, apply the theorems and know the necessary assumptions for certain equalities to hold, e.g. when do partial derivatives with respect to x and y commute, when can we interchange limit and integral, etc.

(a) Definition of a partial derivative.

(b) Definition of C^p functions.

(c) Theorem 11.2 - under what conditions do we have $\dfrac{\partial^2 f}{\partial x \partial y}(a,b) = \dfrac{\partial^2 f}{\partial y \partial x}(a,b)$?

(d) Theorem 11.4 - under what conditions do we have $\displaystyle\lim_{x\to x_0} \int_c^d f(x,y)\,dy = \int_c^d \lim_{x\to x_0} f(x,y)\,dy$?

(e) Theorem 11.5 - under what conditions do we have $\displaystyle\frac{d}{dx}\int_c^d f(x,y)\,dy = \int_c^d \frac{d}{dx} f(x,y)\,dy$?

(f) Definition of a differentiable function, definition of a total derivative.

(g) Theorem 11.13 and its **proof**.

(h) Theorem 11.14.

(i) Theorem 11.15.

(j) Theorem 11.20.

(k) Definition of a tangent plane to a surface.

(l) Theorem 11.12 - be able to find tangent planes to given surfaces (see Problems 11.3.2 and 11.3.3).

(m) Be able to apply the Chain Rule for functions of several variables (see Example 11.29, Problems 11.4.6, 11.4.8, 11.4.9).

(n) Definition of directional derivative and its relation to gradient; properties of gradient (See Problem 11.4.11).

(o) Definition of a convex set.

(p) Be able to prove certain simple sets are convex.

(q) Definition of local minimum and local maximum.

(r) Theorem 11.51 and its **proof**.

II. Review homework problems.

III. Review quizzes.