MA 213 Worksheet #14

Section 14.7
10/11/18

1 Find the local maximum and minimum values and saddle point(s) of the function.

(a) *14.7.5*: $f(x, y) = x^2 + xy + y^2 + y$

(b) *14.7.7*: $f(x, y) = (x - y)(1 - xy)$

2 *14.7.33* Find the absolute maximum and minimum values of $f(x, y) = x^2 + y^2 + x^2y + 4$ on the set $D = \{(x, y) \mid |x| \leq 1, |y| \leq 1\}$.

3 *14.7.45* Find three positive numbers whose sum is 100 and whose product is a maximum.

4 *14.7.53* A cardboard box without a lid is to have a volume of $32,000$ cm^3. Find the dimensions that minimize the amount of cardboard used.

5 *14.7.42* Find the point on the plane $x - 2y + 3z = 6$ that is closest to the point $(0, 1, 1)$. Note: The distance to a plane formula on page 830 in the textbook can be used to check your answer.

6 *14.7.55* If the length of the diagonal of a rectangular box must be L, what is the largest possible volume?

7 *14.7.58* Three alleles (alternative versions of a gene) A, B and O determine the four blood types A (AA or AO), B (BB or BO), O (OO), and AB. The Hardy-Weinberg Law states that the proportion of individuals in a population who carry two different alleles is

$$P = 2pq + 2pr + 2rq$$

where p,q and r are the proportions of A, B and O in the population. Use the fact that $p + q + r = 1$ to show that P is at most $\frac{2}{3}$.