Due Wednesday, October 23rd Problem Set # 7

Math-215 Fall 2017

Please box your answers for each of the exercises below. Also, be mindful of your presentation, I will deduct 10 points for disorganized or unintelligible answers.

Exercises 96/100 (12 points each)

1) Section 11.6, problems: # 3 - 6.
2) Section 11.6, problems: # 7 - 11.
3) Section 11.6, problems: # 15 - 17.
4) Section 11.6, problems: # 20.
5) Section 11.7, problems: # 1 & 2; do both of these.
6) Section 11.7, problems: # 3 - 9.
7) Section 11.7, problems: # 10 - 14.
8) Section 11.7, problems: # 31 - 33.

More difficult problems 4/100 (2 points each). *Please submit these on a separate sheet.*

9) Suppose that a person has money invested in five stocks. Let x_i be the number of shares held in stock i and let $f(x_1, x_2, x_3, x_4, x_5)$ equal the total value of the stocks. If $\nabla f = \langle 2, -1, 6, 0, -2 \rangle$, indicate which stocks should be sold and which should be bought, and indicate the relative amounts of each sale or buy.

10) The **Hardy-Weinberg law** of genetics describes the relationship between proportions of different genes in populations. Suppose that a certain gene has three types (e.g., blood types of A, B and O). If the three types have proportions p, q and r, respectively, in the population, then the Hardy-Weinberg law states that the proportion of people who carry two different types of genes equals $f(p, q, r) = 2pq + 2pr + 2qr$. Explain why $p + q + r = 1$ and then show that the maximum value of $f(p, q, r)$ is $\frac{2}{3}$.