Pledge: I (we) have not received unauthorized aid on this assignment. I (we) understand the answers that I (we) have submitted. The answers submitted have not been directly copied from another source, but instead are written in my (our) own words.

1. [15 points] Find a growth rate that cubes the run time when we double the input size.

2. [20 points]
   (a) Arrange $n^2$ apples in a square. From each row find the largest one and let $A$ be the smallest of these. From each column find the smallest one and let $B$ be the largest of these. Which apple is bigger, $A$ or $B$?

   (b) The lower bound on the worst cost of a problem has been defined as

   $$
   \min_{A \in \mathcal{A}} \left\{ \max_{I \in \mathcal{I}_n} f_A(I) \right\}.
   $$

   Is this the same as

   $$
   \max_{I \in \mathcal{I}_n} \left\{ \min_{A \in \mathcal{A}_M} f_A(I) \right\}?
   $$

3. [15 points] A chocolate company decides to promote its chocolate bars by including a coupon with each bar. A bar costs a dollar and with $c$ coupons you get a new bar.

   How much chocolate is a dollar worth?

   Be careful! This problem is not particularly hard, but its not as trivial as it might seem if you are not paying attention.