WORKSHEET: APPLIED MINIMIZATION AND MAXIMIZATION PROBLEMS

Names and student IDs: _____

You have a large apartment building in a unique rural location outside the city Megalopolis. It has 1000 one bedroom apartments. Currently, you charge rent of $700 per month, and 800 of your apartments are occupied. Market research claims that for every $100 per month decrease in the rent, 200 more apartments will be occupied. What rent should you charge to get the largest rental income?

Remember the steps:

(1) Understand the problem. (This applies to almost every kind of problem.)
(2) Draw a picture (if possible). (This applies to many kinds of problems.)
(3) Label or name the quantities which appear in the problem. Be sure to use a letter for anything whose value isn't already given.
(4) Identify what it is you want to maximize or minimize, and whether you want to maximize it or minimize it.
(5) Write down an equation (or more than one) which expresses the quantity in Step (4) in terms of other quantities in the problem.
(6) Use relations between the quantities in the problem to express the quantity in Step (4) as a function of only one other quantity. (If the quantity in Step (4) depends independently on two or more other quantities, multivariable calculus is needed. See Math 281.)
(7) Determine the allowed values of the variable in the formula in Step (6). **(I must see you do this.)**
(8) Use calculus to find the maximum or minimum value, as appropriate, of the function in Step (6), subject to the restrictions in Step (7).
(9) Check that what you got in Step (8) really is the maximum or minimum, as appropriate. **(I must see you do this.)**

A cylinder is inscribed in a sphere of radius 2 yards. What is the largest possible area of the curved part of the surface of the cylinder?

(Use the back of the page.)

Date: Friday 1 December 2017.