MATH 1634, Review for Hour Exam 3

- The exam will be on the materials covered in Sections 4.1–4.7.
- The formulae that you have to know to solve Optimization Problems are the ones in the examples done in class, in homeworks, or something very basic (such as the circumference of a circle or the volume of a box). **Make sure you know all those formulae. No excuse that you didn't know the necessary formulae to solve an optimization problem.**

1. Find the local maxima or minima of $f(x)$ by any method that you like. *Show your work CLEARLY as we did in class. Give your answer in Cartesian coordinates.* **§4.3**
2. Sketching curves. **§4.3, 4.5**. The problem will give you a guideline:
   (a) Find the local maxima or minima, if exist. *Show your work CLEARLY as we did in class. Give your answers in Cartesian coordinates.*
   (b) Find the inflection points, if exist. *Show your work CLEARLY as we did in class. Give your answers in Cartesian coordinates.*
   (c) Sketch the curve. *Show your work CLEARLY as we did in class, such as a Big Table also.*
   (d) Find asymptotes if exist. Give your answer in **equation**, and draw the asymptotes in (c).
3. Computing limits using l'Hospital's Rule. Always check the condition to apply l'Hospital's Rule. **§4.4**
4. Optimization problems. See the sample problems below:
   - If 1200 cm^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box.
     (a) Picture and Variables.
     (b) Set up, but do **not** evaluate, the function and the equation in terms of two variables as we did in class. That is, choose MAXIMIZE or MINIMIZE, find appropriate expressions at underlines ____ in the followings;

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & \underline{\qquad\qquad} \\ & \text{(The object to optimize using two variables from (a))} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(The equation type of restriction on your two variables)} \end{cases}$$

     (c) Set up, but do **not** evaluate, the single variable function and the interval to be solved as we did in class.

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & (\quad) = \underline{\qquad\qquad} \\ & \text{(The single variable function to optimize)} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(An valid (open or closed) interval on your variable)} \end{cases}$$

     (d) Find the optimum points of the function in (c). *Show the reason why your critical point yields the optimum value.*
     (e) Interpret your answer. That is, state clearly the volume.

- Find the dimensions of the rectangle of largest area that has its base on the x-axis and its other two vertices above the x-axis and lying on the parabola $y = 8 - x^2$.
  (a) Picture and Variables.
  (b) Set up, but do **not** evaluate, the function and the equation in terms of two variables as we did in class. That is, choose MAXIMIZE or MINIMIZE, find appropriate expressions at underlines ____ in the followings;

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & \underline{\qquad\qquad} \\ & \text{(The object to optimize using two variables from (a))} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(The equation type of restriction on your two variables)} \end{cases}$$

  (c) Set up, but do **not** evaluate, the single variable function and the interval to be solved as we did in class.

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & (\quad) = \underline{\qquad\qquad} \\ & \text{(The single variable function to optimize)} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(An valid (open or closed) interval on your variable)} \end{cases}$$

  (d) Find the optimum points of the function in (c). *Show the reason why your critical point yields the optimum value.*
  (e) Interpret your answer. That is, state clearly the dimensions.

* *The following "distance"-type of problem will not appear on the upcoming hour exam but can appear on the final exam.*

- Find the points on the ellipse $4x^2 + y^2 = 4$ that are farthest away from the point $(1, 0)$.
  (a) Picture and Variables.
  (b) Set up, but do **not** evaluate, the function and the equation in terms of two variables as we did in class. That is, choose MAXIMIZE or MINIMIZE, find appropriate expressions at underlines ____ in the followings;

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & \underline{\qquad\qquad} \\ & \text{(The object to optimize using two variables from (a))} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(The equation type of restriction on your two variables)} \end{cases}$$

  (c) Set up, but do **not** evaluate, the single variable function and the interval to be solved as we did in class.

$$\begin{cases} \text{MAXIMIZE/MINIMIZE} & (\quad) = \underline{\qquad\qquad} \\ & \text{(The single variable function to optimize)} \\ \text{Restricted to} & \underline{\qquad\qquad} \\ & \text{(An valid (open or closed) interval on your variable)} \end{cases}$$

(d) Find the optimum points of the function in (c). *Show the reason why your critical point yields the optimum value.*

(e) Interpret your answer. That is, state clearly the points.

Remind you of our class policy for the missing exam:

- *Remember the policy in case you fall sick: You must write me an email* **BEFORE** *the exam –* **no excuse!** *If you fail to do so, there will be penalty.*
- *If you are late for the exam, I interpret that you do so at your own risk. There won't be any way to make up your lost time.*