**MATH 1591 - Review of Chapter 3**

# 1 Main Topics

1. Linear approximation of a function
2. L'Höpital's Rule
3. How to find the absolute maximum and minimum
   Follow the following three steps.
   - find critical numbers of a function
   - evaluate the function at critical numbers and the endpoints
   - compare these values
4. How to find a local maximum and minimum
   - Use the First derivative Test
   - Use the Second derivative Test
5. How to find intervals of increase, decrease and concavity?
6. How to find inflection points?
7. How to sketch the graph of a function?
   - find the vertical and horizontal asymptotes;
   - find the intervals of increase and decrease;
   - find the local minimum and maximum;
   - find the intervals of concavity and inflection points;
   - make a table
   - plot critical points like max, min and inflection points and then connect them.
8. How to solve an optimization problem?
   - Draw a diagram;
   - write the primary equation for a quanty $Q$ that is to be maximized or minimized;
   - write the second equation from a given condition;
   - Calculate the derivative of $Q$ and set it equal to zero.
9. How to find a related rate from another given rate?
   - Draw a diagram;
   - Figure out what are given and what is to be found
   - write down an equations relating all of the relevant quantities;
   - differentiate the equations with respect to time $t$;
   - Solve for the unknown rate.

## 2 Review Exercises

Review Exercises of Chapter 3 (page 339): All odd numbers from 1 to 49.

## 3 Self-test

Please work on the following problems and then grade them yourself.

Problems from Review Exercises of Chapter 3 (page 339): 2, 10, 12, 24, 30.
Exercises 3.7: 15
Exercises 3.8: 9