Test 3 Study Guide

Test 3 covers from §3.10-§4.9(Linear Approximation and Differentials to Antiderivatives)

The following list is not meant to be complete and it is not bound by test 3 but gives an indication of the basic subjects you should study. Happy studying!

§ 3.10 Linear Approximation and Differentials

- $L(x) = f'(a)(x-a) + f(a)$

Ex: Use a linear approximation to approximate $\sqrt{146}$(Hint:$\sqrt{144} = 12$)

Using calculator to get $\sqrt{146}$ directly may get no credit! Use a=144, (the nicer number), $f(x) = \sqrt{x}, x = 146$

$$L(x) = f'(a)(x-a) + f(a)$$
$$= \frac{1}{2\sqrt{144}}(146-144) + \sqrt{144}$$
$$= 12.083$$

Exercises: #2, 10, 14(b), 16, 27.

§ 3.11 Hyperbolic Functions

Exercises: #12, 30, 40

§ 4.1 Maximum and Minimum Values

- Finding local maximum or local minimum: #9, 24, 26
- Critical Point: An interior point at which $f'(x) = 0$ or fails to exist.

1. Must check if it's in the domain of $f(x)$
2. It cannot be the endpoints.

Exercises: #40, 44

Locating absolute maximum or absolute minimum: #53, 60.

§ 4.2 The Mean Value Theorem

- Application of Rolle's Theorem: #3, 6
- Application of MVT : #11, 15, 29

§ 4.3 How Derivatives affect the shape of the Curves

Exercises: #16, 32, 44

§ 4.4 Indeterminate Forms and L'Hospital's Rule

- Indeterminate forms $\frac{0}{0}, \frac{\infty}{\infty}, 0 \cdot \infty, \infty - \infty$
- $0 \cdot \infty, \infty - \infty$ can be manipulated into $\frac{0}{0}, \frac{\infty}{\infty}$ in order to apply the L'Hospital's Rule
- May have to apply L'Hospital's Rule multiple times

Exercises: #12, 23, 40, 63

§ 4.5 Summary of Curve Sketching

- Guidelines for sketching a curve:

1. Identify domain

2. Find intercepts

3. Check symmetry and find period (if any)

4. Find vertical/horizontal/oblique asymptotes

5. Find Critical points and inflection points

6. Find interval of increasing/decreasing, concave up/down

7. Identify local maximum/local minimum
8. Sketch the curve.

Exercises: #13, 28, 35

§ 4.7 Optimization Problems

1. Read the problem and identify the variables

2. Identify the objective function

3. Identify constraints to eliminate one variable if necessary, must keep one independent variable

4. Take derivative and use First Derivative Test/Second Derivative Test to locate the Max/Min.

Exercises: #4, 6, 14, 20, 21, 32, 41

§ 4.8 Newton's Method

Exercises: #7, 15, 21, 29

§ 4.9 Antiderivatives

- $F(x)$ is the antiderivative of $f(x)$ if $F'(x) = f(x)$

- All antiderivatives are of the form $F(x)$+C, where C is an arbitrary constant
  Exercises: #17, 19, 47, 64