Math 112: Review

Integrals

1. Give the definition of the **definite integral** and explain its meaning. Give an example of a definite integral and sketch a picture to interpret what it means geometrically.

2. Explain the meaning of an **indefinite integral**. Give an example.

3. Explain how the **Fundamental Theorem of Calculus** connects definite and indefinite integrals. Give an example.

4. Give three examples of **applications for integrals**. Provide as many details as possible. Give specific integrals, functions, units, etc.

5. Provide examples of three **methods for integration**. Give specific examples if you can.

6. Explain the need for **numerical integration**. Give one such example and draw a picture to demonstrate how the method works.

7. Give examples of the two types of **improper integrals**. Explain what it means for an improper integral to converge. Describe how to determine if an improper integral converges.

Series

1. Explain the difference between a **sequence** and a **series**.

2. Explain what it means for a **sequence** to converge.

3. Explain what it means for a **series** to converge.

4. Give an example of a **geometric series** that converges and find the value of the series.

5. Give an example of a p-**series** that converges and describe how we might determine that it converges.

6. Give three examples of **convergence/divergence tests**, and how they are used on a specific series.

7. Explain what is meant by a **power series**. Give two reasons we may want to represent a function as a power series.

8. Show how to compute the **Taylor series** for a specific function.

Differential Equations

1. Give an example of a **differential equation** and the **direction field** it generates.

2. Explain how to approximate solutions to differential equations using **Euler's Method**. Give an example.

3. Give an example of a **separable differential equation** and show how to find the solution.

4. Describe solutions to the **logistic equation**. Give two reasons why the logistic equation might be a good model of a changing population.

5. Compare solutions to the logistic equation with solutions to the law of natural growth. Explain what is meant by **relative growth rate** in these models.