MATH 253 FINAL EXAM STUDY GUIDE

Here are some good review questions. The actual exam might be of a different format, but these will help you understand the concepts covered on the exam. Try to do as many of these as you can without looking in your notes or book for guidance.

1. All questions from Quizzes 1, 2, 3.

2. All assigned homework problems and review problems for Midterms 1 and 2.

3. Recall that $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots$ for $|x| < 1$. Use Taylor's Inequality to determine what degree Taylor polynomial should we use in order to guarantee that we are approximating $\ln(\frac{4}{3})$ to within $\frac{1}{100}$?

4. Find a number n such that the approximation of $f(x) = e^x$ by its Taylor polynomial of degree n centered at $\frac{1}{2}$ gives an error of less than $\frac{1}{100}$ on the interval $[0, 1]$.

5. Find the radius of convergence of the power series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n! x^n}{(3n)!}$.

6. Define a function S by $S(x) = \begin{cases} \dfrac{\sin(2x)}{x} & x \neq 0 \\ 2 & x = 0. \end{cases}$. Find $S''(0)$.

7. Define a function L by $L(x) = \begin{cases} \dfrac{\ln(x)}{x-1} & x \neq 1 \\ 1 & x = 1. \end{cases}$, Find a power series centered at 1 which converges to $L(x)$ for x in $(0, 2)$.

8. Define $f(x) = e^{2x^3}$ for all real x. Find $f^{(12)}(0)$.

9. Find the radius of convergence of the power series $\displaystyle\sum_{n=0}^{\infty} \frac{3^n x^{2n}}{1 \cdot 3 \cdot 5 \cdot 7 \cdots (2n-1)}$.

10. Consider the power series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n (x-2)^n}{7^{n-3}\sqrt[3]{n+1}}$. You are told that its radius of convergence is 7. Given this, find its interval of convergence.