MATH 152 Assignment 6, Fall 2019.

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Webassign exercises.

11.6 Exercises 1, 3, 7, 10, 25

11.7 Exercises 1, 3, 10, 15

11.8 Exercises 6, 7, 10, 17, 19

11.9 Exercises 5, 7, 17, 27

11.10 Exercises 6, 12, 21, 37, 61, 67, 76

11.11 Exercises 9, 13, 28

Written exercises.

Answers to odd numbered exercises below are in the back of the textbook. Show your working.

1 11.6 Exercise 31

2 11.7 Exercises 12 and 13

3 11.8 Exercise 9

4 11.9 Exercise 11

5 11.9 Exercise 29. See Example 8 in the textbook.

6 11.9 Exercise 37. For part (b) use the fact that the differential equation $f'(x) = f(x)$ has the general solution $f(x) = ce^x$.

7 11.10 Exercise 62

8 11.10 Use series division to calculate the Taylor polynomial $T_4(x)$ for $\frac{x}{\sin x}$ and $\frac{\cos x}{1-x^2}$. See Example 13 and Exercise 69. Use Table 1 on page 768 for the series for $\sin x$ and $\cos x$.

9 For $f(x) = e^x$, consider the degree 4 Taylor polynomial $T_4(x) = 1 + x + x^2/2 + x^3/6 + x^4/24$.

(a) Calculate $e^{0.5}$ and $T_4(0.5)$ and $e^{0.125}$ and $T_4(0.125)$. What are the actual errors?

(b) Use Taylor's inequality on page 762 to bound the error of $T_4(0.5)$ and $T_4(0.125)$.

(c) Notice that the error bound for $T_4(0.125)$ is a lot less than for $T_4(0.5)$. To exploit this we will use $T_4(0.125)$ and the identity $e^x = (e^{x/2})^2$ to approximate $e^{0.5}$ using

$$e^{0.5} = (e^{0.25})^2 = ((e^{0.125})^2)^2 = (e^{0.125})^4.$$

Now calculate $T_4(0.125)^4$. How many decimal places of accuracy do you get for $e^{0.5}$? This basically how your calculator computes e^x. It uses the identity $e^x = (e^{x/2})^2$ for large x and a Taylor polynomial $T_n(x)$ for small x.

The Final Exam is on Thursday December 5th at 3:30pm–6:30pm

About 25% of the final exam mark will be based on the material in this assignment.
I will talk about the final exam (what to study for it) on the last day of class.