

Homework assignments:

- Homework 13. Due Friday, 3 November. Section 4.7 #2, 44. Additional problem: Use the mean value theorem to prove that if  $x \geq 0$ , then  $\sin x \leq x$ . (Hint: The proof is similar to the proof of the monotonicity theorem.) Section 5.1 #10, 22, 44.
- Homework L. Due Monday, 6 November. Section 4.7, #48.
- Homework 14. Due Wednesday, 8 November. Section 5.2 #14, 30. Appendix A #8, Additional problem: Use mathematical induction to prove that

$$\frac{d^n}{dx^n} \frac{1}{x} = \frac{(-1)^n n!}{x^{n+1}}.$$

Hint: Write  $\frac{d^{n+1}}{dx^{n+1}} = \frac{d}{dx} \frac{d^n}{dx^n}$ .

- Homework M. Due Thursday, 9 November. Problem a) Compute the sums

$$1 + 3 + 5 + \dots + (2n - 1) = \sum_{k=1}^n 2k - 1$$

for  $n = 1, 2, 3$  and  $4$  and guess a formula which works for all  $n$ . b) Use mathematical induction to prove that your guess in part a) is correct.

- Homework 15. Due Friday, 10 November. Section 5.3 #22, 26, 36 and Section 5.4 #6, 12.

Suggestions for review.

1. You should make sure that you understand the solution of every homework problem that is handed in. You should work as many problems as you have time for.
2. From section 4.1, you should know the main theorems and our procedure to find the maximum value of a continuous function on a closed interval. What are the three flavors of critical points? Be able to work applied problems (from 4.1 and 4.4) that were assigned.
3. From section 4.2, know the definitions of monotonicity and concavity. Understand the first derivative test for monotonicity. Understand why the second derivative test for concavity is an easy consequence of the monotonicity theorem.

4. From section 4.3, know first and second derivative tests for local maximum values and local minimum values.
5. Know the statement of the mean value theorem. Know the statement and proofs of the mean value theorem's consequences such as the monotonicity theorem and the theorem that if  $f' = 0$ , then  $f$  is constant. Why is my statement of this theorem in the previous sentence incorrect?