Throughout this assignment you will get answers that depend on your bound(s) on $|f''|$ and/or $|f^{(4)}|$. Answers provided in the back of the book are based on the best possible bounds. If you get smaller answers you’re wrong. If you get bigger answers, then you can’t use the provided answer to judge your work as correct or not.

1. §7.6: Problem 9. Find the error bounds asked for in parts I(a) and II(a).

2. §7.6: Problems 17, 19, 21.

3. Suppose that $f(x) = \sqrt{1 + \cos^2 x}$.
   
   (a) Graph $f''(x)$ on the domain $0 \leq x \leq \pi$.
   
   (b) Estimate an upper bound for $|f''(x)|$ on this domain.
   
   (c) Find $n$ so that the Trapezoid Rule applied to $\int_0^\pi \sqrt{1 + \cos^2 x} \, dx$ has error no worse than $10^{-4}$.
   
   (d) Graph $f^{(4)}(x)$ on the domain $0 \leq x \leq \pi$.
   
   (e) Estimate an upper bound for $|f^{(4)}(x)|$ on this domain.
   
   (f) Find $n$ so that Simpson’s Rule applied to $\int_0^\pi \sqrt{1 + \cos^2 x} \, dx$ has error no worse than $10^{-4}$.
   
   (g) Suppose I told you to compute $\int_0^\pi \sqrt{1 + \cos^2 x} \, dx$ with the following restrictions:
      
      - You must use a numerical approximation method.
      - You must show all your work.
      - You can’t use the “int” key on your calculator.
      - Your answer must be within $10^{-4}$ of the true answer.
      
      Would you choose trapezoids or Simpson’s Rule?
   
   (h) Compute $\int_0^\pi \sqrt{1 + \cos^2 x} \, dx$ to within $10^{-4}$. Show all your work. You are not allowed to use the “int” button on your calculator.

4. Refer to §7.6: Problem 27. Use any information available in that problem to compute $\operatorname{Si}(\pi/2)$ to within $10^{-4}$. You must show all work, including work that proves your method is guaranteed to have error less than $10^{-4}$.

5. Refer to §7.6: Problem 28. Use any information available in that problem to compute $\operatorname{erf}(1)$ to within $10^{-5}$. You must show all work, including work that proves your method is guaranteed to have error less than $10^{-5}$.

---

**Hints and Answers**

3: (b) 3, (c) 279, (e) 8, (f) 20, (h) 3.82020

4: 1.37076

5: 0.842700