1 Exercise What are the absolute minimum and absolute maximum of \( f(x) = x - 2\sin x \) on \([-2\pi, 2\pi]\)? At which \( x \) in \((-2\pi, 2\pi)\) does \( f(x) \) have a local maximum? List two intervals on which \( f(x) \) is concave up.

2 Exercise Solve #22 on page 287 of Thomas’ Calculus.

3 Exercise Calculate the following limit.

\[
\lim_{x \to \pi/2} \frac{1}{2x - \pi} \left( \tan x + \frac{2}{2x - \pi} \right)
\]

4 Exercise Let \( f(x) = x^3 - x + 1 \). Prove that \( f(x) \) has a root. Then prove that \( f(x) \) does not have two roots. Apply three iterations of Newton’s method to \( f(x) \), starting with \( x_0 = -1 \). List approximate values (errors not to exceed \( 10^{-4} \)) of \( x_0, f(x_0), x_1, f(x_1), x_2, f(x_2), x_3, \) and \( f(x_3) \). (A calculator or computer is recommended!)

5 Exercise Given \( f'(x) = x^3(4 + \sqrt{x}) + 5\sin(x/3) \) and \( f(0) = -2 \), find \( f(x) \).

6 Exercise (Optional) Use Cauchy’s Mean Value Theorem to prove that the error in approximating \( \sin x \) by \( x \) is not greater than \( x^3/6 \).