Homework 7 – Due Nov. 21

Write clearly, use a different page for each problem and explain all your work. You are encouraged to work together but problems should be written up individually. No late homework will be accepted. Complete the following problems:

- Working from the definition derive formulas for the derivatives of
  a) \( f(x) = x^n \) for any \( n \in \mathbb{N} \),
  b) \( f(x) = 1/x^n \) for any \( n \in \mathbb{N} \),
  c) \( f(x) = \sqrt{x} \).

- Suppose that \( g(x) \) is differentiable at 0 and \( g(0) = g'(0) = 0 \). Show that
  \[
  f(x) = \begin{cases} 
  g(x) \sin \frac{1}{x} & x \neq 0 \\
  0 & x = 0 
  \end{cases}
  \]
  is differentiable at 0 and compute its derivative using the definition.

- 9.22
- 10.24
- 10.29

Additionally complete three of the following problems

- 9.13
- 9.16
- 9.20
- 10.20