Homework to be done by January 13th

Section 10.4: Problems 5, 7, 9, 12, 17, 26, 27, 34, 35, 36.
Section 10.5: Problems 3, 9, 14, 15, 20, 21, 25, 33, 34, 37.
Section 10.6: Problems 5, 6, 7, 9, 13, 16, 19,, 21, 37, 41, 42.
Section 10.7: Problems 7, 8, 11, 13, 17, 21, 22, 37, 43, 47, 51.

Problems to be handed in on January 13th

1. Let f be a twice differentiable function in $\mathbf{R}$. Fix $x \in \mathbf{R}$.

1.1 Prove that
$$\lim_{h \to 0} \frac{f(x + h) - f(x - h)}{2h} = f'(x).$$

1.2 Prove that
$$\lim_{h \to 0} \frac{f(x + h) - 2f(x) + f(x - h)}{h^2} = f''(x).$$

2. Show that for any real number c,
$$\lim_{x \to \infty} \left(\frac{x + c}{x - c} \right)^x = e^{2c}$$

3. Problem 55 in Section 10.6 of Salas and Hille.