

**Fourteenth Homework: MATH 410**  
**Due Friday, 6 December 2019**

1. Let  $D \subset \mathbb{R}$ . Let  $\{f_n\}_{n=1}^{\infty}$  be a sequence of functions such that each  $f_k : D \rightarrow \mathbb{R}$  is uniformly continuous over  $D$ . Let  $f : D \rightarrow \mathbb{R}$  such that  $f_n \rightarrow f$  uniformly over  $D$ . Show that  $f$  is uniformly continuous.
2. Exercise 1 of Section 9.2 in the text.
3. Exercise 4 of Section 9.2 in the text.
4. Exercise 6 of Section 9.2 in the text.
5. Exercise 1 of Section 9.3 in the text.
6. Exercise 4 of Section 9.3 in the text.
7. Exercise 6 of Section 9.3 in the text.
8. Exercise 3 of Section 9.4 in the text.
9. Exercise 4 of Section 9.4 in the text.
10. Exercise 1 of Section 9.5 in the text.
11. Exercise 4 of Section 9.5 in the text.
12. Exercise 7 of Section 9.5 in the text.
13. Exercise 10 of Section 9.5 in the text.
14. Let  $g : [0, 1] \rightarrow \mathbb{R}$  be continuous. Show that

$$\lim_{n \rightarrow \infty} \int_0^1 nx^{n-1}g(x) dx = g(1).$$