Fifteenth Homework: MATH 410
Due Friday, 11 December 2020

1. Let $D \subset \mathbb{R}$. Let $\{f_n\}_{n=1}^{\infty}$ be a sequence of functions such that each $f_k : D \to \mathbb{R}$ is uniformly continuous over D. Let $f : D \to \mathbb{R}$ such that $f_n \to f$ 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 $g : [0, 1] \to \mathbb{R}$ be continuous. Show that

$$\lim_{n\to\infty} \int_0^1 nx^{n-1} g(x)\, \mathrm{d}x = g(1)\,.$$