

Third Homework: MATH 410
Due Wednesday, 23 September 2020

1. Exercise 1 of Section 2.3 in the text.
2. Exercise 3 of Section 2.3 in the text.
3. Exercise 7 of Section 2.3 in the text.
4. Prove Proposition 2.18 in the notes.
5. Prove Proposition 2.19 in the notes.
6. Prove Proposition 2.20 in the notes.
7. Prove Proposition 2.21 in the notes.
8. Let $\{a_n\}_{n \in \mathbb{N}}$ be a Cauchy sequence in \mathbb{R} . Show that every subsequence of $\{a_n\}_{n \in \mathbb{N}}$ is convergent and that they all have the same limit.
9. Show that $\{1/n^2\}_{n \in \mathbb{Z}_+}$ is not contracting.
10. Let $a_0 > 0$ and $a_{n+1} = 1/(1 + a_n)$ for every $n \in \mathbb{N}$. Show that the sequence $\{a_n\}_{n \in \mathbb{N}}$ is contracting and evaluate its limit.
11. Let $a_0 > 0$ and $a_{n+1} = \frac{1}{2}(a_n + 3/a_n)$ for every $n \in \mathbb{N}$. Show that the sequence $\{a_n\}_{n \in \mathbb{N}}$ is contracting and evaluate its limit.
12. Exercise 12 of Section 2.4 in the text.