

## MAT 319-320 HOMEWORK WEEK 2

Solve 7.1, 7.3, 8.1 (a) through (c), 8.2 (a) through (c), 9.13, 9.18 from Ross.

**Question 1.** Say if the following statements are true or false. Carefully justify your answer.

- (1) A statement  $P(n)$ ,  $n \in \mathbb{N}$ , is true frequently if and only if it is true for infinitely many values of  $n$ .
- (2)  $\sqrt{n} \in \mathbb{N}$  frequently.
- (3)  $\sqrt{n} \in \mathbb{Q}$  frequently.

**Question 2.** For  $a_n = n(n + 1)$  say if the following statements are true or false:

- (1)  $a_n$  is eventually even,
- (2)  $a_n$  is eventually odd,
- (3)  $a_n$  is frequently even,
- (4)  $a_n$  is frequently odd.

**Question 3.** Let  $a_n$  be some sequence. Say if the following statements are true or false, and justify your answer.

- (1) If  $a_n \rightarrow +\infty$  then  $a_n$  must be eventually increasing.
- (2) If  $a_n > 0$ , and  $a_n$  is unbounded then  $a_n$  must diverge to  $+\infty$ .
- (3) If  $a_n \rightarrow 0$  then either  $a_n \rightarrow 0^+$  or  $a_n \rightarrow 0^-$ .
- (4) If  $a_n \rightarrow 0^+$  then  $a_n$  must be eventually decreasing.