Name: ______________________________________ **Math 1152Q: Spring '18**

Week 2 SAMPLE Quiz

All technology (phone, calculator, anything that has a computer) should be stored in your bag during the quiz.

1. (Reviewing vocabulary) Let f be a function and let a be a real number. According to Stewart's definition, f is called *continuous* at a if:

   i. $f(a)$ is ______________ ,

   ii. ______________ exists, and

   iii. $f(a) =$ ______________.

   Answer: See Sec 2.5 pages 115-117 def 1 and 3.

2. (Reviewing vocabulary) Let f be a function that is defined on $(-\infty, \infty)$.

   i. According to Stewart's definition, writing

   $$\lim_{x \to \infty} f(x) = 50$$

   means that ____

   ____.

   Answer: See Sec 2.6 page 127.

   ii. In this situation, does the limit of $f(x)$ (as x increases without bound) exist?

3. (Reviewing vocabulary) Let f be a function that is defined on $(-\infty, \infty)$.

   i. According to Stewart's definition, writing

   $$\lim_{x \to \infty} f(x) = \infty$$

   means that ____

   ____.

   ii. In this situation, does the limit of $f(x)$ (as x increases without bound) exist?

   Answer: See Sec 2.6 page 137 for definition of an "infinite limit" at infinity.

4. (a) What is a sequence?

   (b) Let $\{b_n\}$ be a sequence. What does it mean to write $\lim_{n \to \infty} b_n = 7$?

(c) Let $\{b_n\}$ be a sequence. What does it mean to write $\lim_{n\to\infty} b_n = \infty$?

Answer: See the back-of-the-book answer for Sec 11.1 p1(a)–(c) on page 704.

5. (a) What is a convergent sequence? Give two examples.

   (b) What is a divergent sequence? Give two examples.

   Answer: See Examples 4 through 11 in Sec 11.1 pages 698–700

6. (Optional). Finish WebAssign Sec 11.1 no. 1-6 only (access via HuskyCT). Everyone automatically gets a 2-week free trial of WebAssign.

7. (More textbook problems) Sec 11.1 Example 2, Sec 11.1 problems 23, 41, 47, 55, Sec 11.1 problems 65, 69, 71.

8. (Sequence recognition) For each part, (i) find a non-recursive formula for the nth term in the sequence. (ii) Describe the end behavior of this sequence. (iii) If the sequence is convergent, compute or guess its limit - explain (in words or using math symbols) how you get this number (no formal proof is needed).

   (a) $\{5, -5, 5, -5, 5, \dots\}$

   (b) $\{5, 8, 11, 14, 17, \dots\}$

   (c) $\left\{-3, 2, -\frac{4}{3}, \frac{8}{9}, -\frac{16}{27}, \dots\right\}$

   Hint: You can check your work against the computer sequence recognition, for example, using software like WolframAlpha: `https://www.wolframalpha.com/examples/math/calculus/sequences/`

9. (Vocabulary) (Note: $\mathbb{R}$ is the notation for the set of all real numbers.) Let $f : \mathbb{R} \to \mathbb{R}$ be the function defined by

$$f(x) = \frac{16x^2 - 8x - 6}{18x^2 - 6x + 8}.$$

By applying L'Hospital's Rule (see Sec 4.4 page 305) twice, we get

$$\lim_{x\to\infty} f(x) = \frac{16}{18}. \tag{1}$$

Due to a theorem (Thm 3, page 697) explained in Sec 11.1 of Stewart, we can use equation (1) to show that the sequence $\{a_n\}$ defined by

$$a_n = \frac{16n^2 - 8n - 6}{18n^2 - 6n + 8}$$

also converges to $\frac{16}{18}$, or, in notation form,

$$\lim_{n\to\infty} a_n = \frac{16}{18}. \tag{2}$$

What does (2) mean (according to the definition of limit of a sequence)?