

Math 114 Fall 2017  
Calculus I HW 6 Solutions  
Due Wednesday, October 18

1. Stewart 1.5.16

2. Let

$$f(x) = \begin{cases} x + 3 & x > 2 \\ x^2 + 1 & x < 2 \end{cases}$$

Define a function that extends  $f$  and is continuous at all real numbers.

**Solution:** Define

$$f_F(x) = \begin{cases} x + 3 & x > 2 \\ x^2 + 1 & x < 2 \\ 5 & x = 2 \end{cases}$$

Then  $f_F$  is continuous at 2 since  $\lim_{x \rightarrow 2^-} f_F(x) = \lim_{x \rightarrow 2^-} x^2 + 1 = 5$  and  $\lim_{x \rightarrow 2^+} f_F(x) = \lim_{x \rightarrow 2^+} x + 3 = 5$ .

3. Let

$$g(x) = \begin{cases} x^2 - 5 & x > -1 \\ 4x & x < -1 \end{cases}$$

Define a function that extends  $g$  and is continuous at all real numbers.

**Solution:** Define

$$g_F(x) = \begin{cases} x^2 - 5 & x > -1 \\ 4x & x < -1 \\ -4 & x = -1 \end{cases}$$

Then  $g_F$  is continuous at  $-1$  since  $\lim_{x \rightarrow -1^-} g_F(x) = \lim_{x \rightarrow -1^-} 4x = -4$  and  $\lim_{x \rightarrow -1^+} g_F(x) = \lim_{x \rightarrow -1^+} x^2 - 5 = -4$ .

4. Stewart 1.5.30

5. Stewart 1.5.34

6. (★) Stewart 1.5.36 ( $N$  in this problem is the target output, what I called  $y$  in class)

7. Stewart 1.5.38

8. Stewart 1.5.40

9. Stewart 1.5.42