

**MATH310 Homework 2022-08-10**  
**Due Gradescope 11:59pm 2022-08-12**

1. Given the function  $f(x) = 7x - 1$ . Prove that  $f(x) = 7x - 1$  is continuous at  $x = 0$ . You must prove any claims you make about limits. [25 pts]
2. Given the function  $f(x) = 5 - 3x$ . Prove that  $f(x) = 5 - 3x$  is continuous at  $x = 1$ . You must prove any claims you make about limits. [25 pts]
3. Define the following function: [25 pts]

$$f(x) = \begin{cases} 2 + 6x & \text{if } x \geq 10 \\ x + 51 & \text{if } x < 10 \end{cases}$$

Prove that  $f(x)$  is not continuous at  $x = 10$ . You do not need to prove any claims you make about limits.

4. Define the following function: [25 pts]

$$f(x) = \begin{cases} \frac{1}{x-42} & \text{if } x \neq 42 \\ 0 & \text{if } x = 42 \end{cases}$$

Prove that  $f(x)$  is not continuous at  $x = 42$ . You do not need to prove any claims you make about limits.