

**MAT 319 HOMEWORK–8 DUE AT THE BEGINNING OF CLASS ON WEDNESDAY,  
OCTOBER 31**

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit. Clear, organized, partially correct work may receive partial credit.

- (1) Carefully (re)-read sections 17 and 18 from the textbook.
- (2) Use the  $\delta$ - $\epsilon$  definition of continuity to prove that the function  $f(x) = x^2 + 3x - 5$  is continuous at 2.
- (3) Let  $g(x) = \frac{x^2+2x-15}{x-3}$ . Define  $g(3)$  so that  $g(x)$  is continuous at 3, and prove that it is continuous.
- (4) Let

$$h(x) = \begin{cases} 5x & x \text{ is rational} \\ x^2 + 6 & x \text{ is irrational} \end{cases}$$

Determine whether  $h(x)$  is continuous or discontinuous at  $x = 1$ , and prove your result.

Determine whether  $h(x)$  is continuous or discontinuous at  $x = 2$ , and prove your result.

- (5) From the textbook, do problem 17.8, 17.10b, 18.12
- (6) My friend Leina used to let her cat out in the yard, tethered to a 15 foot leash that was nailed into the center of her lawn. Leina once spent 15 minutes watching the cat roam around on the leash. Was there ever a time  $t$ , where  $t$  is measured in minutes, at which the cat was exactly  $t$  feet from the center of the lawn? Prove your result.
- (7) Here are some problems you are not required to submit: 17.2, 17.3, 17.9, 18.5, 18.6.