

Assignment #6, Part B: Due Wednesday, 11/16/11

1. Each of the following formulas purports to define a function $f: \mathbb{R} \rightarrow \mathbb{R}$, but some of them do not. In each case, explain whether the function is
- (a) everywhere defined;
 - (b) uniquely defined;
 - (c) well defined.

If the answer to any of the above questions is “no,” give a brief reason why not. For those formulas that do define a function, determine the range of that function.

$$(a) f(x) = \frac{x^3 + 3}{x + 5}.$$

$$(b) f(x) = \begin{cases} x^2 & \text{if } x \geq 1, \\ x^3 & \text{if } x \leq 0. \end{cases}$$

$$(c) f(x) = \begin{cases} x^2 + 1 & \text{if } x \geq 1, \\ x & \text{if } x < 1. \end{cases}$$

$$(d) f(x) = \begin{cases} \frac{x^2 - 2x + 1}{x - 1} & \text{if } x < 1, \\ x - 1 & \text{if } x > 0. \end{cases}$$

$$(e) f(x) = \begin{cases} \frac{1}{x + 1} & \text{if } x \geq 0, \\ x - 1 & \text{if } x < 1. \end{cases}$$