

Part II:

5. Decide whether each of the following formulas describes a well-defined function $f: \mathbb{R} \rightarrow \mathbb{R}$. For those that do not, give a brief reason why not. For those that do, determine the image.

$$(a) f(x) = \frac{x^2 + 3}{x + 5}.$$

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

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

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

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

6. Eccles, pages 99–100, Exercise 8.3.

7. Eccles, page 117, Problem 14.