Basic Mathematics - Quiz 2
Solutions

We consider the function f defined by

$$f(x) = \begin{cases} \dfrac{x-5}{2x+3} & \text{if } x < -1 \\[2mm] 2x^2 - x + 7 & \text{if } x \geqslant -1. \end{cases}$$

1. Evaluate $f(-3)$ (justify).

   As $-3 < -1$, we use the first expression :

   $$f(-3) = \frac{(-3)-5}{2 \times (-3) + 3} = \frac{-8}{-3} = \frac{8}{3}.$$

2. Evaluate $f(-1)$ (justify).

   As $-1 \geqslant -1$, we use the second expression :

   $$f(-1) = 2 \times (-1)^2 - (-1) + 7 = 2 + 1 + 7 = 10.$$

3. Evaluate $f(2)$ (justify).

   As $2 \geqslant -1$, we use the second expression :

   $$f(2) = 2 \times 2^2 - 2 + 7 = 8 - 2 + 7 = 13.$$

4. Give a value which is outside of the domain of f (justify).

   As the second expression, a polynomial, is always well defined, the only possibility for a point to be outside of the domain is for the first expression. A fraction is well defined if and only if the denominator is not zero. So for a value x to be outside the domain of f, we need to have $2x + 3 = 0$. In other terms $x = -3/2$. As $-3/2 < -1$, we should use the first expression to compute $f(-3/2)$ therefore $-3/2$ is outside of the domain.