

MATH 1101Y 2009 Quiz 1 (b) Solution

1. Find the domain of the function

$$f(x) = \frac{\sqrt{3x+1}}{x}.$$

Solution: The domain is all x such that $3x+1 \geq 0$ and $x \neq 0$.

$$\begin{aligned} 3x+1 &\geq 0 \Leftrightarrow 3x \geq -1 \\ &\Leftrightarrow x \geq -\frac{1}{3} \end{aligned}$$

The domain is $\{x : x \geq -\frac{1}{3} \text{ and } x \neq 0\}$ or $[-\frac{1}{3}, 0) \cup (0, \infty)$. □

2. Find the functions $f \circ g$ and $g \circ f$ where

$$f(x) = x^2, g(x) = \frac{1}{x-1}.$$

Do not simplify.

$$\begin{aligned} f \circ g(x) &= f(g(x)) = f\left(\frac{1}{x-1}\right) \\ &= \left(\frac{1}{x-1}\right)^2. \end{aligned}$$

$$\begin{aligned} g \circ f &= g(f(x)) = g(x^2) \\ &= \frac{1}{x^2-1}. \end{aligned}$$

□

3. Solve the equation for x .

$$\ln(2x+1) = 1.$$

Solution:

$$\begin{aligned} \ln(2x+1) &= 1 \\ e^{\ln(2x+1)} &= e^1 \\ 2x+1 &= e \\ 2x &= e-1 \\ x &= \frac{e-1}{2}. \end{aligned}$$

□