Practice – 1

Once you feel confident with function operations, complete problems 1 to 4. Check your answers by going to the Solutions tab in Moodle.

Instructions: Answer each of the following practice questions on a separate piece of paper. Step by step solutions are provided under the Solutions tab. You will learn the material more thoroughly if you complete the questions before checking the answers.

1. Given the functions $f(x) = 2x^2 - 5x$ and $g(x) = -x^2 + x + 4$, determine $(f+g)(x)$ and $(f-g)(x)$. State the domain of each combined function.

2. Given the functions $f(x) = \frac{1}{x-4}$ and $g(x) = \sqrt{x-3}$, determine the domain of $(fg)(x)$ and $\left(\frac{f}{g}\right)(x)$.

3. If $f(x) = 2 - x$ and $g(x) = x + 1$, sketch the graph of $(fg)(x)$.

4. A metal block in the shape of a rectangular prism is heated, causing it to expand. Initially, the area of the base is $5\ \text{cm}^2$. The area of the base doubles every minute. The initial height of the block is $10\ \text{cm}$. The height increases by $3\ \text{cm}$ every minute.

   a. Write a function representing the area of the base as a function of time. Hint: this can be modelled by an exponential function of the form $A(x) = A_0 b^x$.

   b. Write a function to represent the height of the block as a function of time.

   c. Use the functions from parts a. and b. to determine a function that represents the volume of the block as a function of time.

   d. What would be the volume of the rectangular prism after 2 minutes?