

ASSIGNMENT 2

Abhishek Kumar
AI21BTECH11003

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Question 1(i)

$$f : R \rightarrow R, f(x) = x^2 \quad (1)$$

$$g : R \rightarrow R, g(x) = 2x^2 + 1 \quad (2)$$

R is the set of Real Numbers. Find $f \circ g(x)$ and $g \circ f(x)$.

Solution

Lets find $f \circ g(x)$

$$\begin{aligned} f(x) &= x^2, g(x) = 2x^2 + 1 \\ \Rightarrow f(g(x)) &= (2x^2 + 1)^2 \\ \Rightarrow f \circ g(x) &= 4x^4 + 4x^2 + 1 \end{aligned} \quad (3)$$

Lets find $g \circ f(x)$

$$\begin{aligned} f(x) &= x^2, g(x) = 2x^2 + 1 \\ \Rightarrow g(f(x)) &= 2(x^2)^2 + 1 \\ \Rightarrow g \circ f(x) &= 2x^4 + 1 \end{aligned} \quad (4)$$

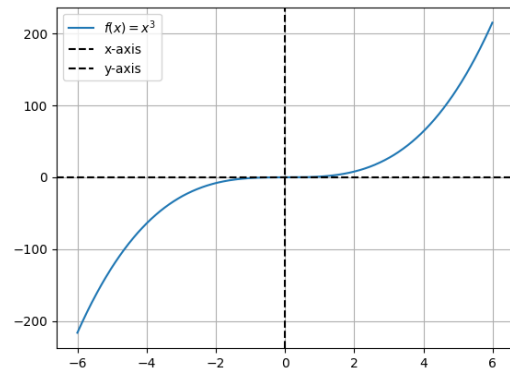


Figure 1: $f(x)=x^3$

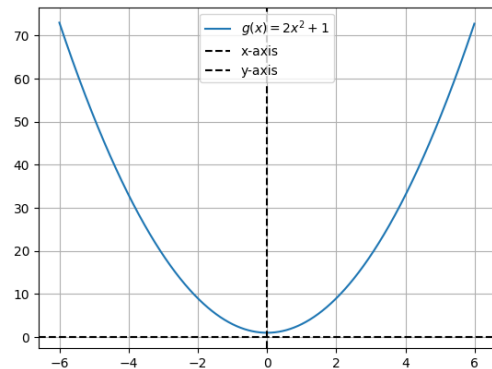


Figure 2: $f(x)=2x^2 + 1$

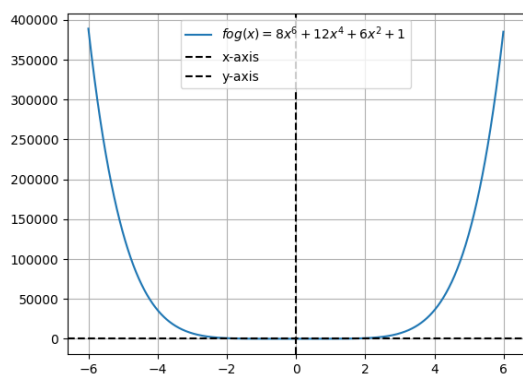


Figure 3: $fog(x) = 8x^6 + 12x^4 + 6x^2 + 1$

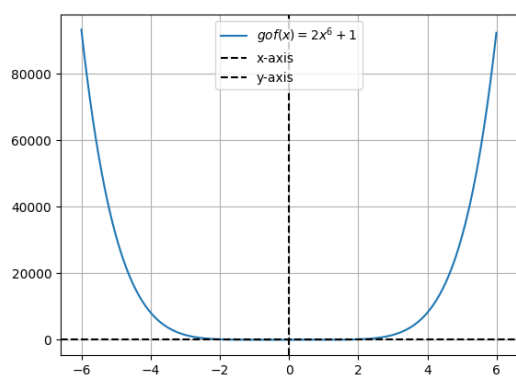


Figure 4: $gof(x) = 2x^6 + 1$