

AP Calculus AB
Group Assignment
Distinguishing Between Product of Functions & Composite Functions

$f(x)g(x)$ is a product of two functions: $F_1 \times F_2$ where: $F_1 = f(x)$ $F_2 = g(x)$

Note: i) Both f and g have a simple input of just x ! Both are functions of just x .

ii) It is read: " $f(x)$ **times** $g(x)$ "

$f[g(x)]$ is a composition of two functions, i.e. "A function of another function."

Note: i) The input to f is not just x - the input to f is another function, g . (The input to g can be just x).

ii) It is read: " f **of** $g(x)$ "

iii) f is called the **Outside Function** and g is called the **Inside Function**.

Examples

1. $x^2 \cos(x)$ Read it: " x^2 times $\cos(x)$ " \rightarrow **Product**

 f and g are both functions of just x \rightarrow **Product**

2. $\cos(x^2)$ Read it: "Cosine of x^2 " \rightarrow **Composition**

Outside function: $\cos(\)$ Inside function: x^2

3. $(2x^2 + 3x)^4$ Read it: "4th Power of $(2x^2 + 3x)$ " \rightarrow **Composition**

Outside function: $(\)^4$ Inside function: $(2x^2 + 3x)$

4. $e^{\sin x}$ Read it: "e of $\sin x$ " \rightarrow **Composition**

Outside function: $e^{(\)}$ Inside function: $\sin x$

5. $e^x \sin x$ Read it: "(e of x) times (sine of x)" \rightarrow **Product**

Both functions are functions of just x \rightarrow **Product**

Determine if the following are a product or a composition of functions.

- i. If it is a product, state the two individual functions.
- ii. If it is a composition, state the outside and the inside function.

Function	Product or Composition?	Product		Composition	
		F_1	F_2	Outside Function	Inside Function
$e^x(x^3 - 1)$					
$(x^2 + 9)(2 - \ln x)$					
$(t + \sin t)^4$					
$\sin^5 x$					
$\cos(5n)$					
$5x(\tan x)$					
$\sqrt{11z + 4}$					
$\sin(\cos \theta)$					
$\sec\left(\frac{1}{x}\right)$					
$(\sqrt{x} + 1)(\sqrt{x} - 1)$					
$(4g + 9)^{\frac{1}{2}}$					
e^{e^x}					