IB$_1$ **Maths SL Pre-Test 7**

Wednesday 28 May 2025

Subject: *Domain & composite functions* ANSWERS

Question 1

Find the *domain* of the following functions

1) $f_1(x)=\frac{3x^5-17x^3+x(x+1)-2}{12}$ $D_1=\mathbb{R}$

2) $f_2(x)=\frac{(x-1)(x-2)(x-3)}{(x-4)(x-5)(x-6)}$ $D_2=\mathbb{R}\setminus\{4,5,6\}$

3) $f_3(x)=\frac{\sqrt{x}}{(x-2)(x-3)}$ $D_3=[0,\infty[\setminus\{2,3\}$

4) $f_4(x)=\frac{\sqrt{x-4}}{x^2-5x+6}$ $D_4=[4,\infty[\setminus\{2,3\}$

5) $f_5(x)=13\sqrt{5-x}+18\log_5(x-7)+\frac{3}{x}$ $D_5=\varnothing$ $\varnothing$ is named the *empty set*

$5-x\geqslant 0$ and $x-7\geqslant 0$ then $x\leqslant 5$ AND $x\geqslant 7\Rightarrow$ impossible!

Question 2

Given $f(x)=\frac{4x}{x+1}$ and $g(x)=\frac{x-1}{4}$

1) $(f\circ g)(x)=\frac{4\left(\frac{x-1}{4}\right)}{\left(\frac{x-1}{4}\right)+1}=\frac{x-1}{\frac{x-1}{4}+\frac{4}{4}}=\frac{x-1}{\frac{x+3}{4}}=(x-1)\frac{4}{x+3}=\frac{4(x-1)}{x+3}$

2) $(f.g)(x)=\frac{4x}{x+1}\cdot\frac{x-1}{4}=\frac{x(x-1)}{x+1}$

3) Bonus :

$(f\circ g)(x)=(f.g)(x)\Leftrightarrow\frac{4(x-1)}{x+3}=\frac{x(x-1)}{x+1}\Leftrightarrow\frac{4}{x+3}=\frac{x}{x+1}\Leftrightarrow 4(x+1)=x(x+3)\Leftrightarrow x^2-x-4=0$

$\Leftrightarrow x_1=\frac{-1\pm\sqrt{17}}{2}$
x_2