## Solution to Practice Exercise For Lecture 7

**Q1.** Consider functions $f(\mathrm{x})=(x-2)^3$ and $g(\mathrm{x})=\dfrac{1}{x^2}$. Find the composite function $(fog)(x)$ and also find the domain of this composite function.

Solution.

*Here* $f(x)=(x-2)^3$ *and* $g(x)=\dfrac{1}{x^2}$, then from the definition of composition of functions, we have

$$fog(x)=f(g(x))$$
$$=f(\frac{1}{x^2})$$
$$=(\frac{1}{x^2}-2)^3$$

If we put $x=0$ in the above function, then the function becomes undefined, so

*Domain of* $fog(x)=(-\infty,0)\cup(0,+\infty)$

**Q2.** *Let* $f(x)=x+1$ *and* $g(x)=x-2$. *Find* $\left(f+g\right)(2)$.

Solution. From the definition,

$$\left(f+g\right)(x)=f\left(x\right)+g\left(x\right)=x+1+x-2$$
$$=2x-1$$

Hence, if we put $x=2$, we get

$$\left(f+g\right)(2)=2(2)-1=3$$

**Q3.** Let $f(\mathrm{x})=\mathrm{x}^2+5$ and $g(\mathrm{x})=2\sqrt{\mathrm{x}}$. Find $\left(\mathrm{gof}\right)(\mathrm{x})$. Also find domain of $(gof)\left(x\right)$.

Solution.

By definition,

$$(gof)(x) = g(f(x))$$
$$= g(x^2+5)$$
$$= 2\sqrt{x^2+5}$$

*Domain of* $f(\text{x}) = (-\infty, +\infty)$

*Domain of* $g(\text{x}) = [0, +\infty)$

*Hence,*

Domain of $gof(x) = [-\infty, +\infty)$

**Q4.** Given $f(\text{x}) = \dfrac{3}{x-2}$, and $g(\text{x}) = \sqrt{\dfrac{1}{x}}$

Find the domain of these functions. Also find the intersection of their domains.

Solution.

Here $f(x) = \dfrac{3}{x-2}$, so

domain of $f(x) = (-\infty, 2) \cup (2, +\infty)$

Now consider $g(x) = \sqrt{\dfrac{1}{x}} = \dfrac{1}{\sqrt{x}}$

Domain of $g(x) = (0, +\infty)$.

Also, intersection of domains will be:

*domain of* $f(x) \cap$ *domain of* $g(x) = (0, 2) \cup (2, +\infty)$

**Q5.** Given $f(\text{x}) = \dfrac{1}{x^2}$ and $g(\text{x}) = \dfrac{2}{x-2}$, find $(f-g)(3)$.

Solution.

$$(f-g)(x) = f(x) - g(x)$$

$$= \frac{1}{x^2} - \frac{2}{x-2}$$

$$(f-g)(3) = \frac{1}{9} - \frac{2}{1} = \frac{1-18}{4} = \frac{-17}{9}$$