Answer on Question #55766 – Math – Algebra

Task 1. Give an example of each of the following:

a. A function whose domain is $[2, \infty)$

Answer: $f(x) = 2 + \sqrt{x-2}$

b. An arithmetic sequence

Answer: 1; 3; 5; 7; 9; 11…

$$a_1 = 1, d = 2$$

c. A system of equations with no solutions

Answer:

$$\begin{cases} x + y = 2 \\ x + y = 3 \end{cases}$$

Task 2. For $f(x) = \frac{1}{x^2} - 3$, find:

a. $f(3) = \frac{1}{3^2} - 3 = \frac{1}{9} - 3 = \frac{1-27}{9} = -\frac{26}{9}$

Answer: $-\frac{26}{9}$

b. $f(2+h) = \frac{1}{(2+h)^2} - 3 = \frac{1-3(2+h)^2}{(2+h)^2} = -\frac{11+12h+h^2}{(2+h)^2}$

Answer: $-\frac{11+12h+h^2}{(2+h)^2}$

Task 3. For $f(x) = \frac{1}{x} - 5$ and $g(x) = x^2 + 2$, find:

a. $(f\ o\ g)(x) = f\big(g(x)\big) = \frac{1}{g(x)} - 5 = \frac{1}{x^2+2} - 5$

Answer: $\frac{1}{x^2+2} - 5$

b. $(g\ o\ f)(6)$

Find $(g\ o\ f)(x) = g\big(f(x)\big) = f^2(x) + 2 = \left(\frac{1}{x} - 5\right)^2 + 2$

Then $(g\ o\ f)(6) = \left(\frac{1}{6} - 5\right)^2 + 2 = \left(-\frac{29}{30}\right)^2 + 2 = \frac{841}{900} + 2 = \frac{2641}{900} = 2\frac{841}{900}$

Answer: $2\frac{841}{900}$