

Answer on Question #51655 – Math – Calculus

For the following functions determine the domain, co-domain and range:

$$f(x) = (x-1)^2 + 2x$$

$$g(x) = \cos(2x) + 1$$

Using $f(x)$ & $g(x)$ calculate:

$$f + g$$

$$f - g$$

$$f * g$$

$$g/f$$

Solution

$$f(x) = (x - 1)^2 + 2x = x^2 - 2x + 1 + 2x = x^2 + 1$$

The domain of $f(x)$ is the set of all the values that x is allowed to take on.

The range of $f(x)$ is the set of all y -coordinates, where $y = f(x)$.

What may possibly come out of a function is called the co-domain.

What actually comes out of a function is called the range.

The domain of $f(x)$ is $(-\infty; +\infty)$;

the range of $f(x)$ is $[1; +\infty)$;

the co-domain of $f(x)$ is $(-\infty; +\infty)$.

$$g(x) = \cos(2x) + 1$$

The domain of $g(x)$ is $(-\infty; +\infty)$;

the range of $g(x)$ is $[0; 2]$;

the co-domain of $g(x)$ is $(-\infty; +\infty)$.

$$f + g = x^2 + 1 + \cos(2x) + 1 = x^2 + \cos(2x) + 2$$

$$f - g = x^2 + 1 - \cos(2x) - 1 = x^2 - \cos(2x)$$

$$f * g = (x^2 + 1) * (\cos(2x) + 1) = x^2 \cos(2x) + x^2 + \cos(2x) + 1$$

$$\frac{g}{f} = \frac{\cos(2x)+1}{x^2+1} = \frac{\cos^2x-\sin^2x+\cos^2x+\sin^2x}{x^2+1} = \frac{2\cos^2x}{x^2+1}$$