

Chapter #3 (3.1)

Final exam review sheet q#4(a)

find the difference quotient $\frac{f(x+h)-f(x)}{h}$

(assume $h \neq 0$) for:

a) $f(x) = x^2 + 5x + 2$

Solution:-

So first we have to find $f(x+h)$

$$\begin{aligned} f(x+h) &= (x+h)^2 + 5(x+h) + 2 \\ &= (x^2 + 2xh + h^2) + 5x + 5h + 2 \\ &= x^2 + 2xh + h^2 + 5x + 5h + 2 \end{aligned}$$

Now we have to subtract $f(x)$
from $f(x+h)$

$$\begin{aligned} f(x+h) - f(x) &= x^2 + 2xh + h^2 + 5x + 5h + 2 - (x^2 + 5x + 2) \\ &= x^2 + 2xh + h^2 + 5x + 5h + 2 - x^2 - 5x - 2 \\ &= 2xh + h^2 + 5h \end{aligned}$$