

NAME:

STUDENT NO:

Q-5) Find

$$\lim_{x \rightarrow 0} \frac{6(\tan x)(\sec x) - 6x - 5x^3}{(e^x - 1 - x)(\sin x - x)}.$$

Solution:

Using the Taylor expansions of the functions involved in the limit, we have

$$\frac{6(\tan x)(\sec x) - 6x - 5x^3}{(e^x - 1 - x)(\sin x - x)} = \frac{\frac{61}{20}x^5 + \frac{277}{168}x^7 + \dots}{-\frac{1}{12}x^5 - \frac{1}{36}x^6 + \dots} \rightarrow -\frac{183}{5} \text{ as } n \rightarrow \infty.$$