Part B: Written Answer Questions (60 marks)

In Part B, you must fully justify all your answers. Provide full solutions and show all your work. Part marks may be given. A correct answer with false reasoning or little to no justification will not receive any marks. Simplify your answers as much as possible, unless stated otherwise. Points are indicated by each question.

1. a) (*8 marks*) Using the **limit definition** of the derivative, compute $f'(x)$ if

$$f(x) = \frac{1}{3x+1}.$$

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

$$= \lim \frac{\frac{1}{3(x+h)+1} - \frac{1}{3x+1}}{}$$