MATH153 - Homework 4

due date: March 29

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1. Show that if $f(x)$ satisfies $f(x+y) = f(x) + f(y)$ for all x and y and $f(x)$ is continuous at $x = 0$ then $f(x)$ is contiuous at a for all a

2. Show that the equation $2sinx = 3 + 2x$ has a root in the interval $(-\pi, 0)$

3. If exists, find $f'(0)$. If not, explain why?

$$f(x) = \begin{cases} \dfrac{sin(x)}{x} + 5x + 23 & \textbf{if } x < 0 \\ x^2 + 6x + 18 & \textbf{if } x \geq 0 \end{cases}$$

4. Show that the derivative of an odd differentiable function is even and that the derivative of an even differentiable function is odd.