pg. 61, #46

Suppose $f(x) = \tan(1/x)$.

a.) If $z = \frac{1}{\pi n}$, where n is an integer, it follows that

$$f(z) = \tan\left(\frac{1}{1/\pi n}\right) = \tan(\pi n) = 0.$$

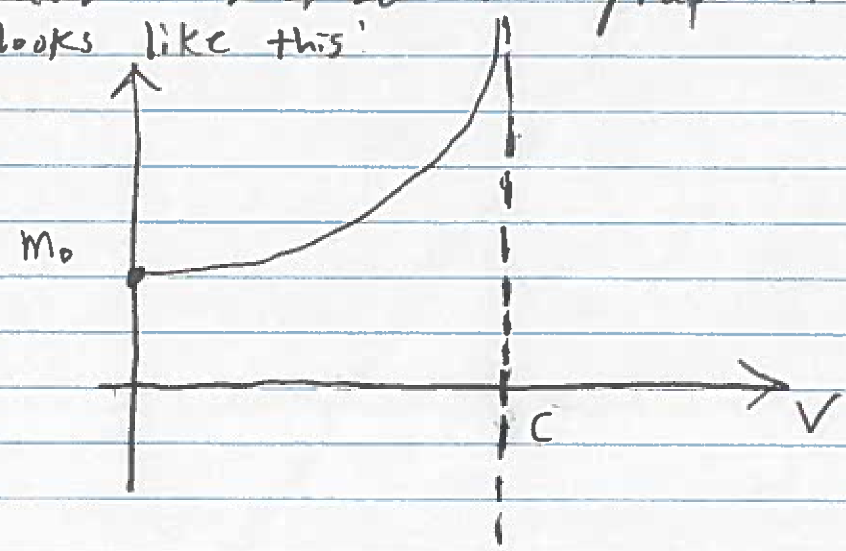
b.) If $z = \frac{4}{\pi(1+4n)}$, where n is an integer, it follows t

$$f(z) = \tan\left(\frac{1}{\frac{4}{\pi(1+4n)}}\right) = \tan\left(\frac{\pi}{4(1+4n)}\right) = 1.$$

c.) Therefore, as x gets closer to zero, $f(1/x)$ changes between 1 and 0 infinitely many times. This implies the limit cannot exist.

pg. 62, #48

Let $m(v) = m_0 / \sqrt{1 - v^2/c^2}$. The graph of this function looks like this:



Therefore,

$$\lim_{v \to c^-} m(v) = \infty.$$

Consequently, as the velocity approaches the speed of light the mass becomes arbitrarily large.