MAT126, Paper Homework 2

1. Let

$$f(x) = \int_1^{1/x} \arctan(t)\, dt$$

Find $f'\left(\frac{1}{\sqrt{2}}\right)$.

2. A lemur rancher needs to invest in some high-tech lemur grooming machines. She determines that the machines will depreciate at a rate $f(t)$, and the cost of keeping them in top running condition is given by another function $g(t)$, where t is the time that the machines have been running.

The cost of keeping the machines around (instead of replacing them with new ones) is given by

$$C(t) = \frac{1}{t} \int_0^t (f(t) + g(t))\ dt$$

Show the critical points of $C(t)$ occur when $C(t) = f(t) + g(t)$.