

Find the acceleration function of a helicopter whose height is $h(t) = 2t^3 - 0.1e^t + t + 200$.

$$v = 6t^2 - 0.1e^t + 1$$

$$a = 12t - 0.1e^t$$

$$a(t) = \underline{12t - 0.1e^t}$$

Find its acceleration at time $t = 5$.

$$a(5) = \underline{12(5) - 0.1e^5} = 45.158$$

Is the helicopter speeding up or slowing down from $t = 0$ to $t = 5$?

$$v(5) = 6(5)^2 - 0.1e^5 + 1 = 136.158$$

Speeding up

Slowing down

v and a have the same sign

Find the equation of the tangent line to $f(x) = \sin x \tan x$ at $x = \pi/6$.

$$f'(x) = \sin x \sec^2 x + \cos x \tan x$$

$$f'(\pi/6) = \left(\frac{1}{2}\right)\left(\frac{4}{3}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{3}}\right) = \frac{2}{3} + \frac{1}{2} = \frac{7}{6}$$

$$f(\pi/6) = \sin \pi/6 \tan \pi/6 = \frac{1}{2} \cdot \frac{1}{\sqrt{3}} = \frac{1}{2\sqrt{3}}$$

$$y - \frac{1}{2\sqrt{3}} = \frac{7}{6} \left(x - \frac{\pi}{6}\right)$$

answer: _____