1. $f(x) = 3\sqrt[3]{x}$ at $x = 8$

$f(8) = 3\sqrt[3]{8} = 3(2) = 6$

$f'(x) = \frac{d}{dx}[3\sqrt[3]{x}]$ $3 \cdot \frac{1}{3}x^{-2/3} + 0 \cdot x^{1/3} = x^{\frac{-2}{3}} = \frac{1}{x^{\frac{2}{3}}} = \frac{1}{\sqrt[3]{x^2}}$

$f'(8) = \frac{1}{\sqrt[3]{8^2}} = \frac{1}{\sqrt[3]{64}} = \frac{1}{4}$

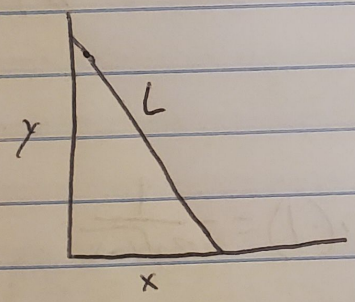
$L(x) = f(a) + f'(a)(x - a)$

$L(8) = 6 + \frac{1}{4}(x - 8) = 6 + \frac{x}{4} - 2 = \boxed{\frac{x}{4} + 4}$

$\frac{8.04}{4} + 4 = 2.01 + 4 = \boxed{6.01}$

$\frac{8.8}{4} + 4 = 2.2 + 4 = \boxed{6.2}$

2.




$L = 15$ $\frac{dL}{dt} = 0$ $\left(x^2 + y^2 = L^2\right)\frac{d}{dt}$

$x = 12$ $\frac{dx}{dt} = 5$

$y = 9$ $\frac{dy}{dt} = ?$ $2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$\boxed{x(t)^2 + y(t)^2 = L^2}$

$\frac{2y}{2}\frac{dy}{dt} = -\frac{2x}{2}\frac{dx}{dt}$

$\boxed{2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0}$

$y\frac{dy}{dt} = -x\frac{dx}{dt}$ $\frac{dy}{dt} = \frac{-x\frac{dx}{dt}}{y}$

$15^2 = 12^2 + y^2$

$y^2 = 15^2 - 12^2$

$y^2 = 225 - 144 = 81$ $y = 9$

$\frac{dy}{dt} = \frac{-(12)(5)}{9} = \boxed{-6.67 \text{ ft/s}}$