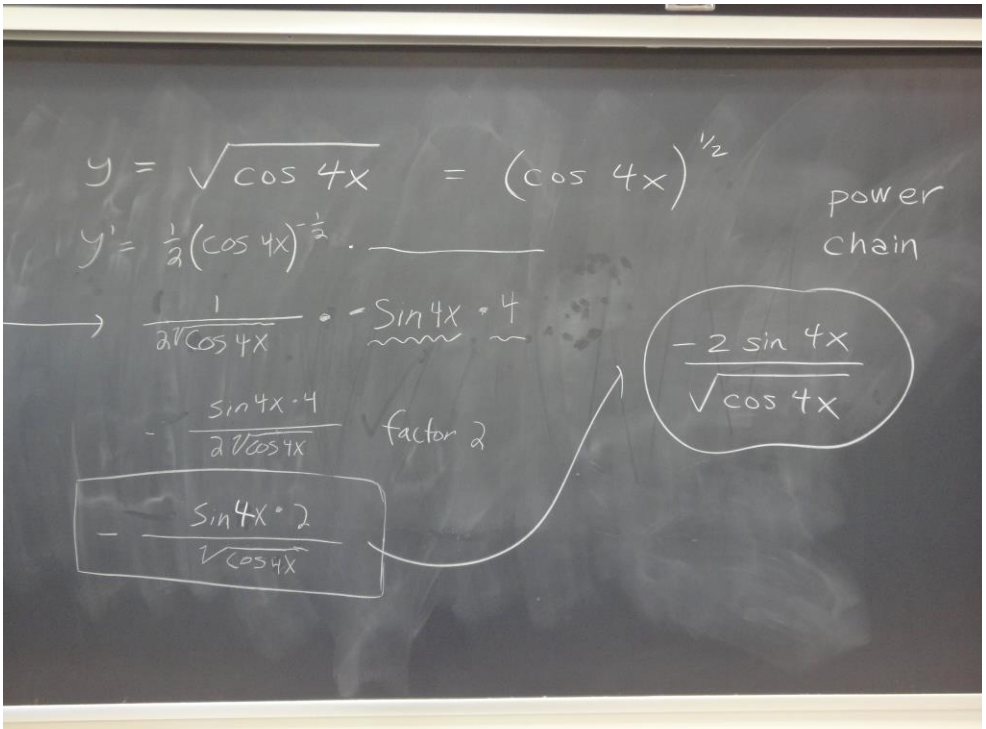
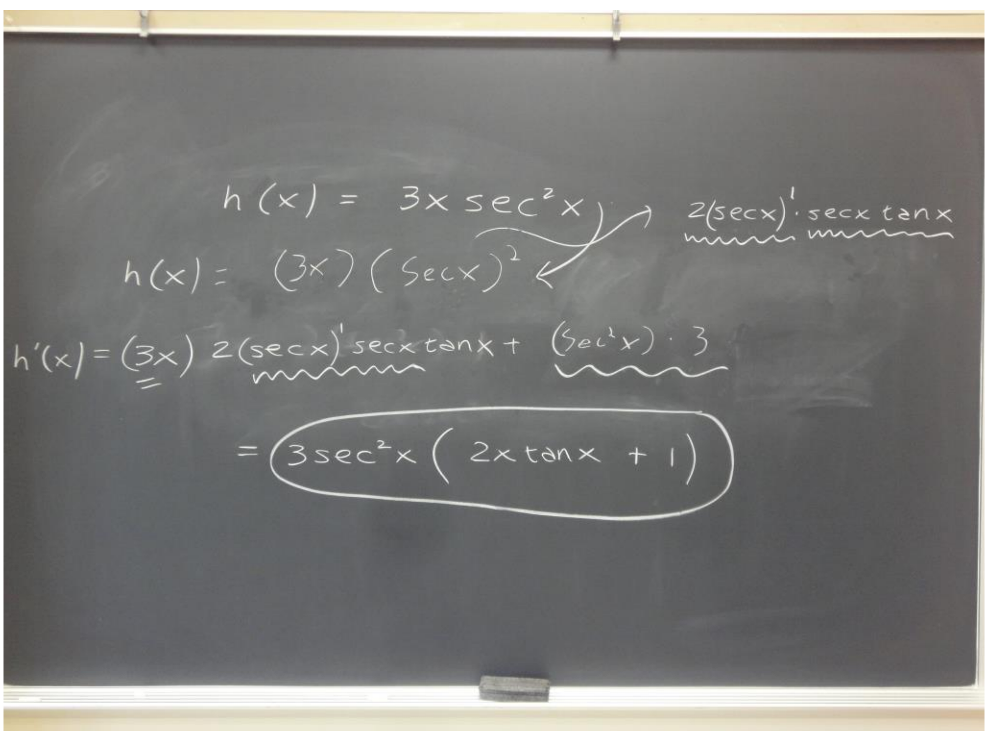
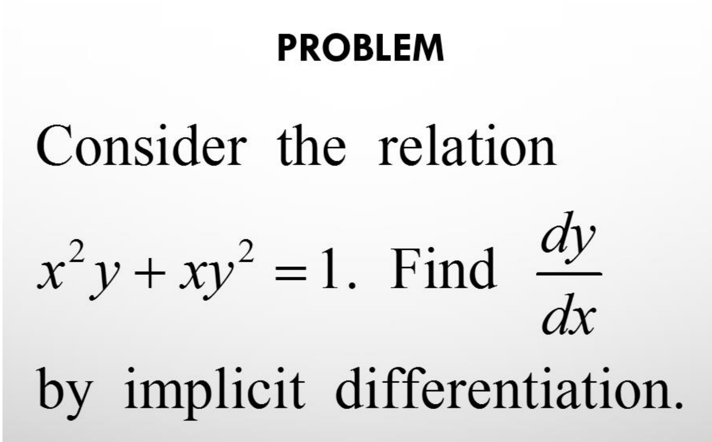
May 31, 2017

Some Warming Up with the Chain Rule:

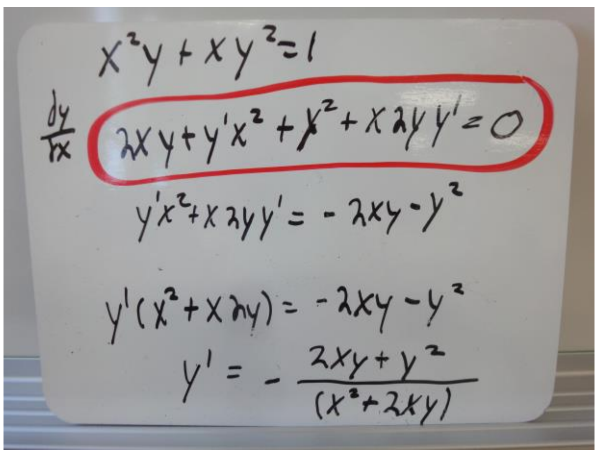


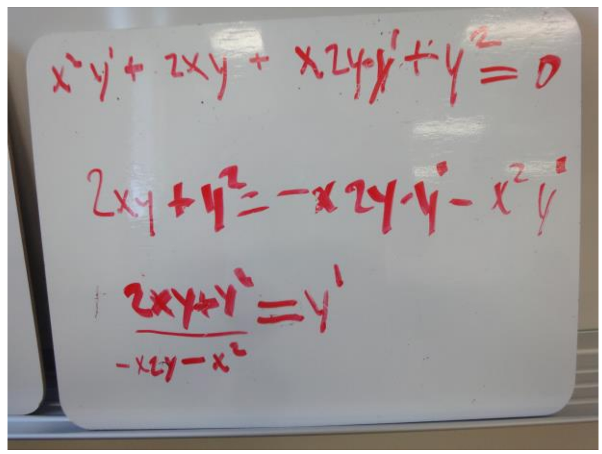


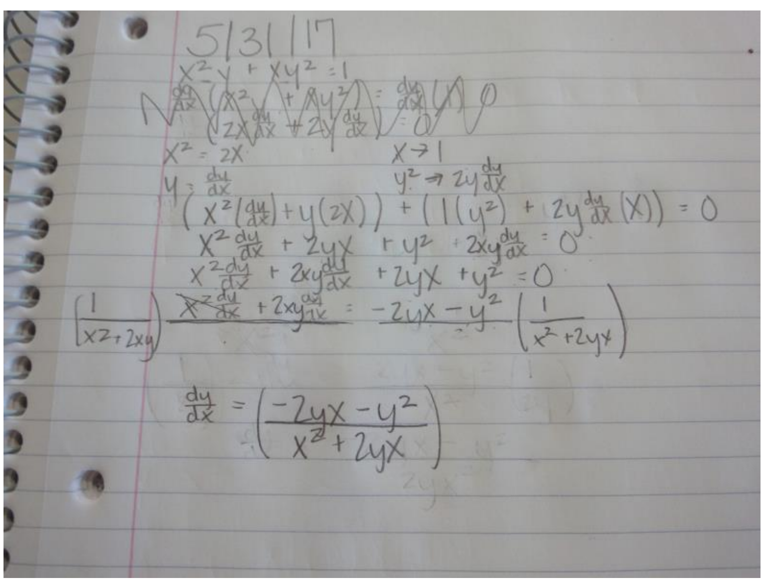
2.6: Implicit Differentiation (continued)

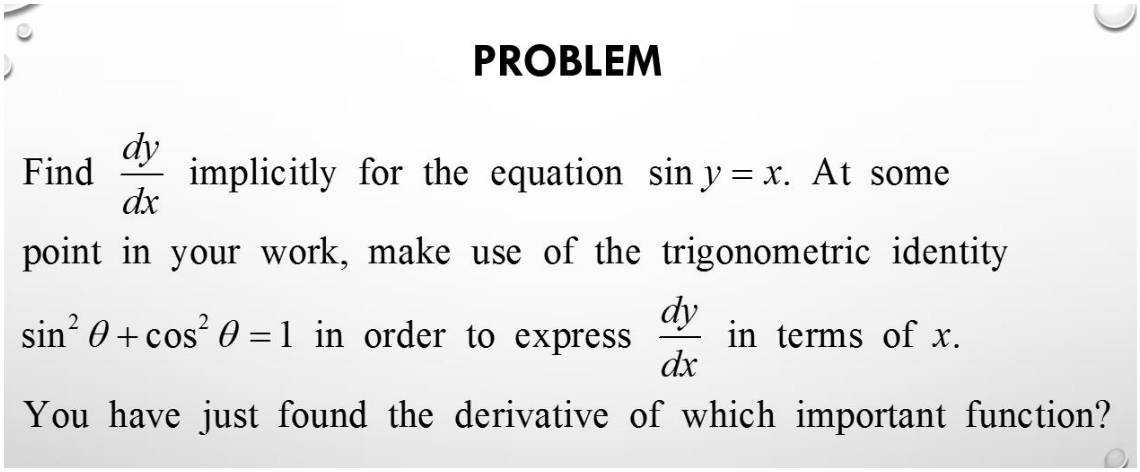


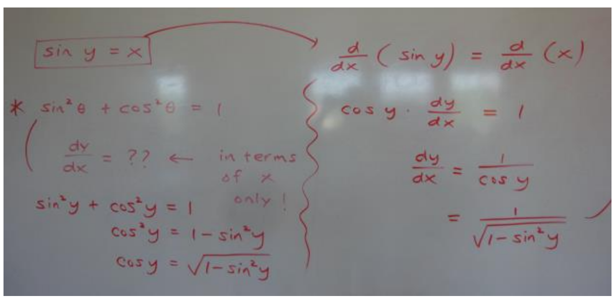
Three variations (all are correct):

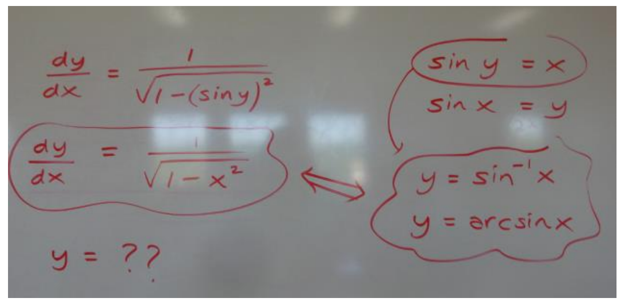






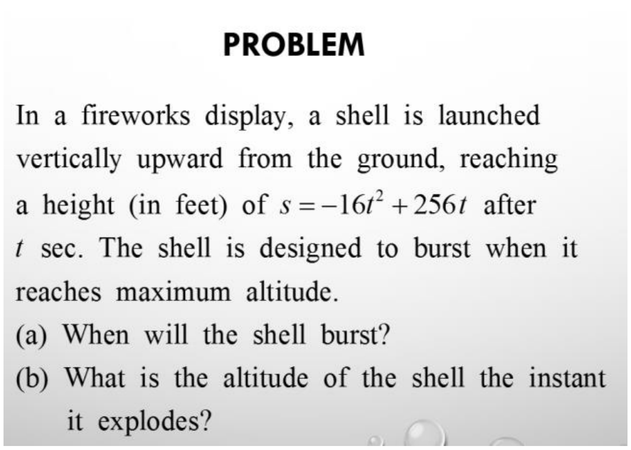


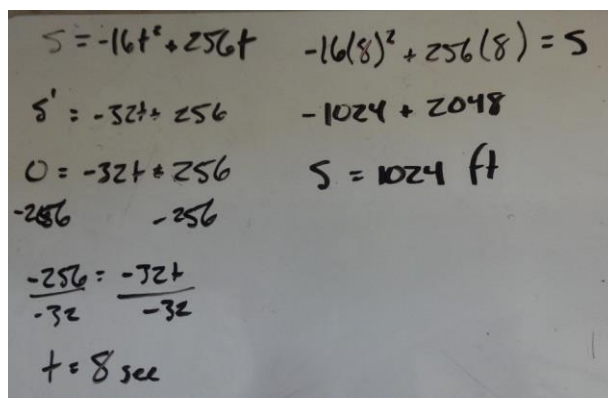




From the above work, given $y = \sin^{-1} x = \arcsin x$, we get $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$.

2.7 : Applications of the Derivative





<u>Important</u>: We set $s'(t) = 0$ in part (a) because the shell bursts at maximum altitude. The shell momentarily stops (so velocity = 0).

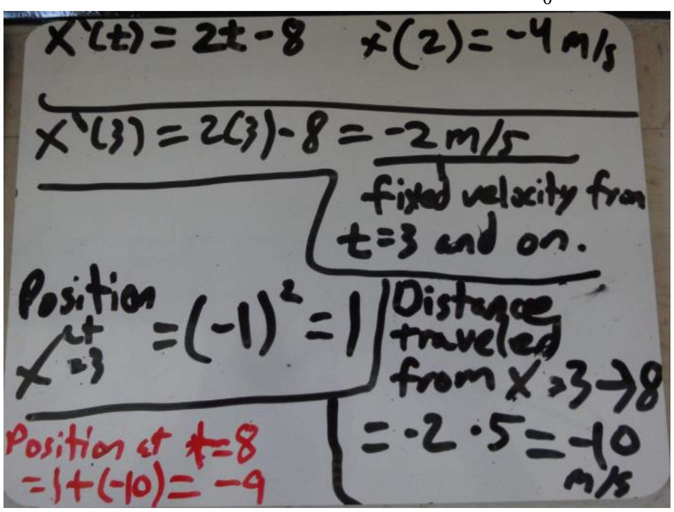
PROBLEM

A machine is causing a particle to move along the x-axis so that its position at time t is given by $x(t) = (t-4)^2$, where t is in seconds.

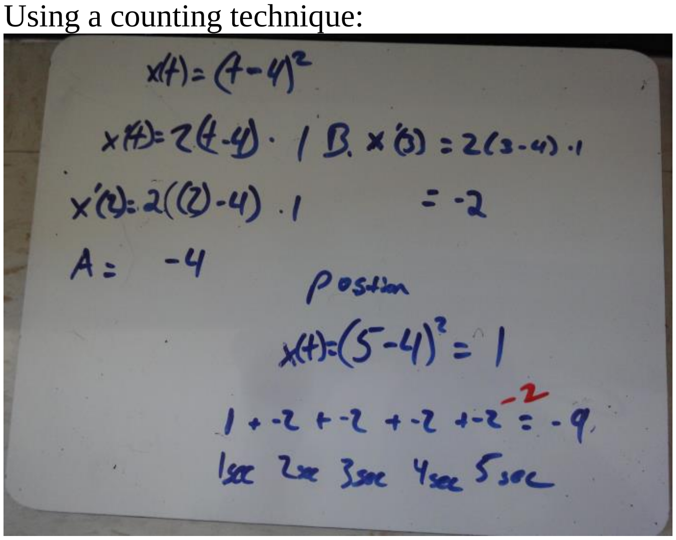
(a) What is the particle's velocity at $t = 2$? Interpret.

(b) The machine stops suddenly at $t = 3$, releasing the particle. As the particle continues, where will it be 5 seconds after the machine stops? Explain your thinking.

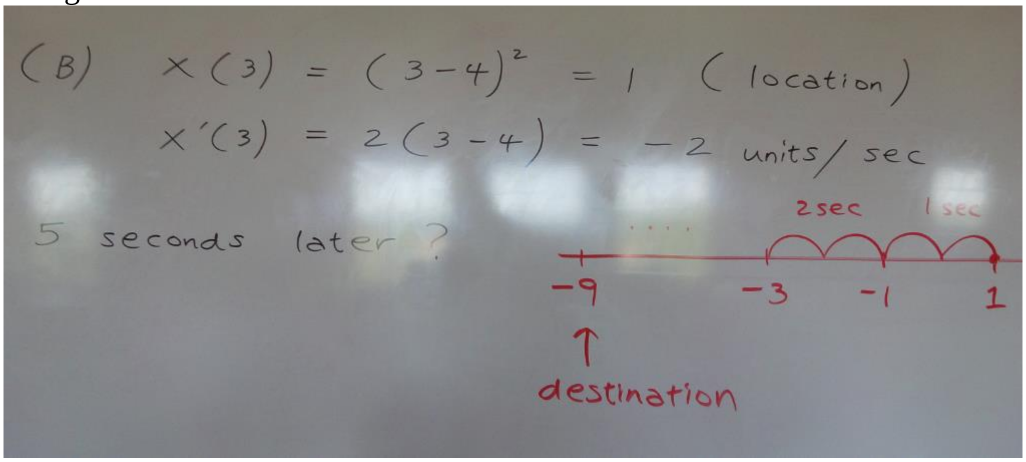
This shows the seeds of the formula $x = x_0 + vt$:



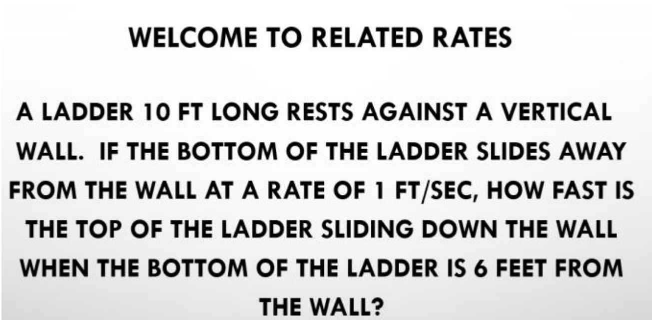
Using a counting technique:

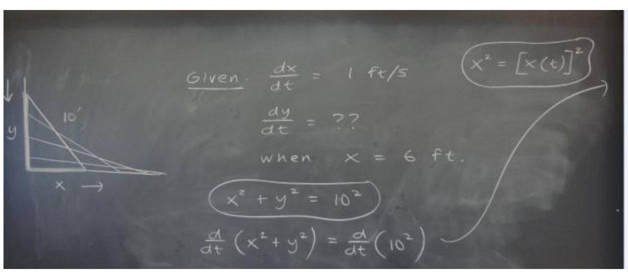


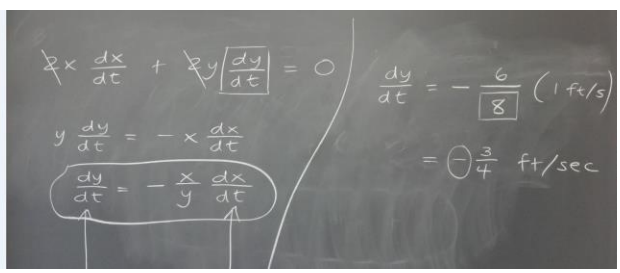
Using a number line:

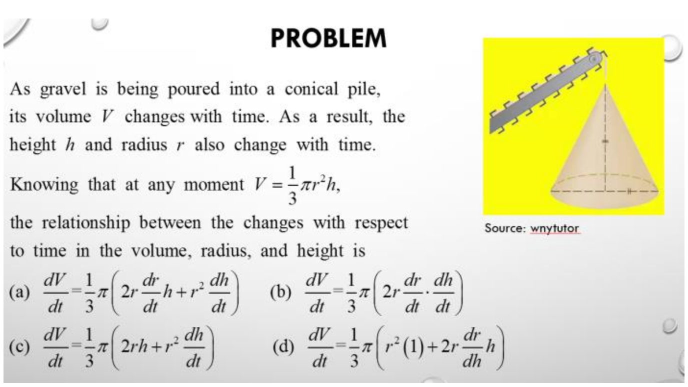


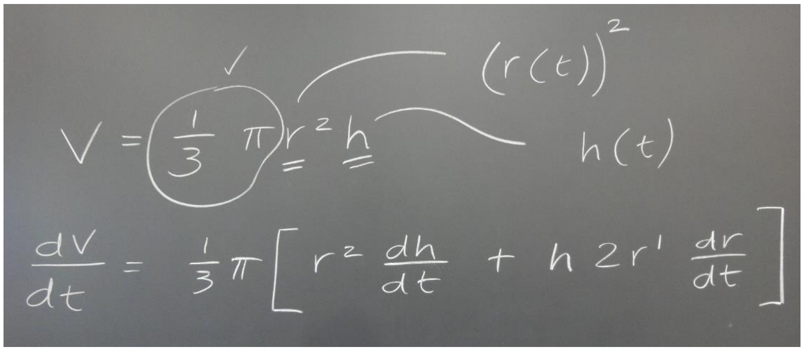
2.8: Related Rates



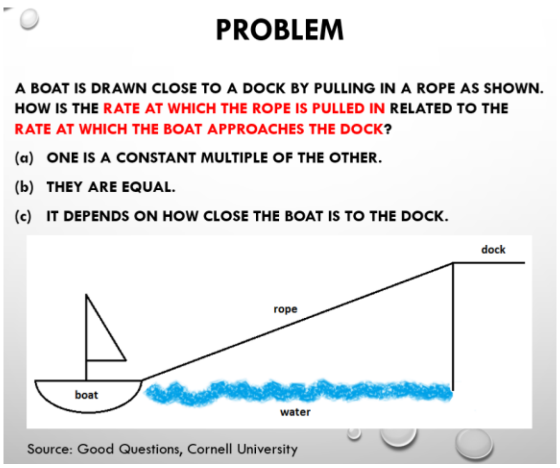


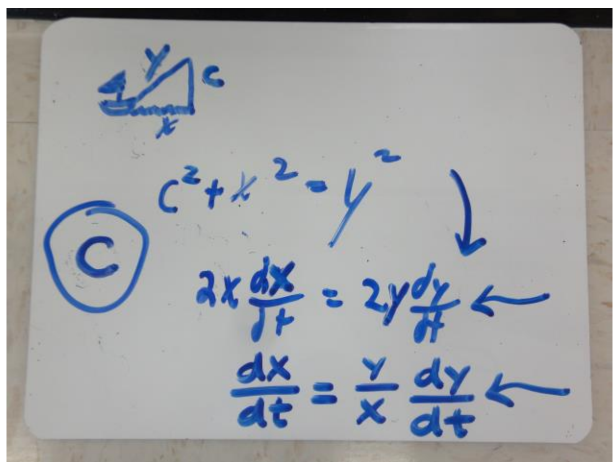






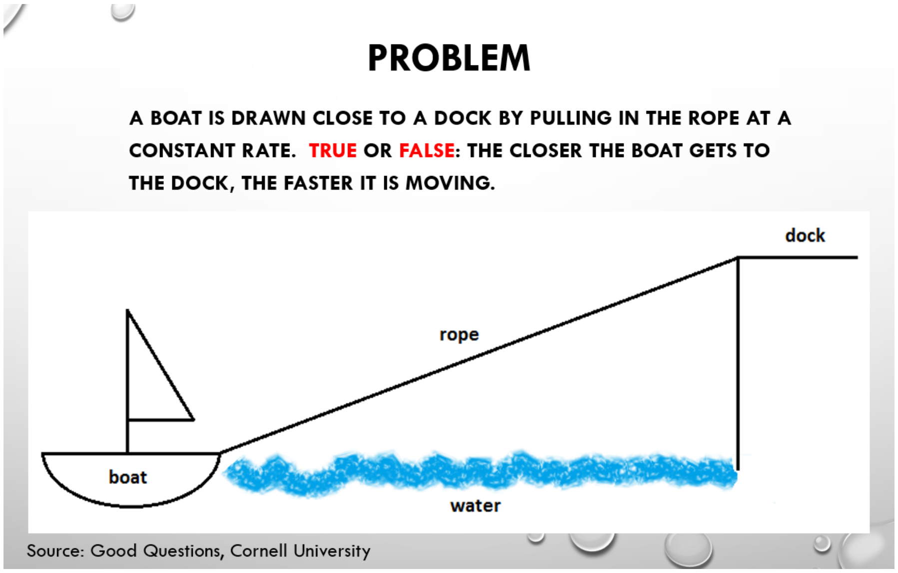
From above, the answer is (a).

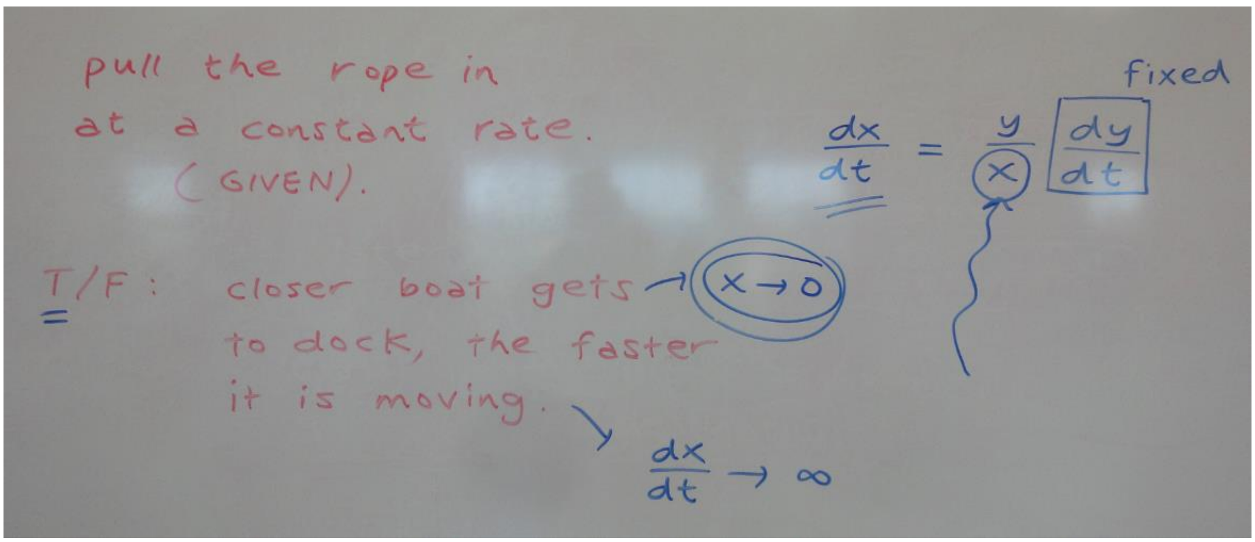




The board to the right shows that the rate at which the boat is pulled in $\left(\frac{dy}{dt}\right)$ is related to the rate at which the boat approaches the dock $\left(\frac{dx}{dt}\right)$; the equation is $\frac{dx}{dt} = \frac{y}{x}\frac{dy}{dt}$. The rates are not equal $\left(\frac{dy}{dt} \neq \frac{dx}{dt}\right)$ and they are not multiples of each other (for example, $\frac{dy}{dt} \neq 3\frac{dx}{dt}$). The answer is (c).

Follow up question:





(This problem picks up where the last one left off.) The statement is True (see work above).