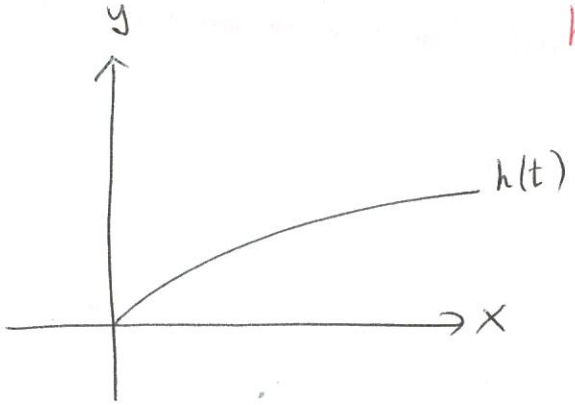
Name: Worksheet 2, Math 1113

1. The height, in meters, of a certain tree changes by the relationship

$$h(t) = \sqrt{\frac{t}{3}},$$

where t is the time in years from when the seed was germinated.

(a) Make a sketch of the height of a tree as a function of time.



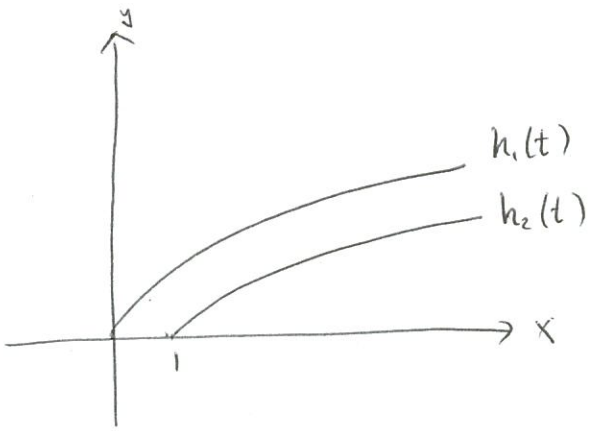
$h(t)$ is $\sqrt{t}$ stretched horizontally by a factor of $\frac{1}{3}$.

(b) Two seeds are planted, and the first seed germinates immediately. The second seed germinates one year after the first is germinated, and then begins to grow. Determine the formulas for the height of the two trees with respect to the time that they were planted. Make a sketch of the two functions on the same graph.

The height of first seed: $h_1(t) = \sqrt{\frac{t}{3}}$

" " " second seed: $h_2(t) = h(t-1) = \sqrt{\frac{t-1}{3}}$

this is $h(t-1)$ since - we are starting 1 year after $\Rightarrow$ changing t (time)
- At $t=1$ (after 1 year), $h_2(t)$ is 0 so we want $h_2(1)=0$



(c) A new strain of the tree is developed that grows to the same height in half the time. Determine the formula that will give the height of the new strain. Make a sketch comparing the height of the original and the new strains.

Height of the new strain:

$$h_3(t) = h(2t) = \sqrt{\frac{2t}{3}}$$

This is $h(2t)$ since - we are changing t (time)
- at $t=1$, $h_3(t)$ should be the same height as $h(2) \Rightarrow h_3(1) = h(2)$