3. [15 points] *Show your work.*

a. [3 points] Find an equation for the straight line passing through the point $(2, -3)$ that is perpendicular to the line passing through the points $(1, 4)$ and $(-6, 5)$.

Answer: $y =$ _____

b. [3 points] A population of ants is growing by 25% per day. How long will it take for the number of ants to double? (*Give your answer in exact form or rounded accurately to three decimal places.*)

Answer: _____

c. [3 points] An ant begins at the point $(1, 0)$ and walks *counterclockwise* along the unit circle for a distance of 2 units and then stops. What are the coordinates of the point at which the ant stops? (*Give your answer in exact form.*)

Answer: _____

d. [3 points] Suppose the graph of $y = h(x)$ is obtained from the graph of $y = 3e^{2x}$ by shifting the graph of $y = 3e^{2x}$ to the right four units and then down five units.
Find a formula for $h(x)$.

Answer: $h(x) =$ _____

e. [3 points] Find the *exact* value of t if $5e^t = 15(2^t)$. (*Show each step of your work carefully.*)

Answer: $t =$ _____