MAT125, Paper Homework "Cup"

1. Let $f(x) = x + \sqrt{x}$.

   (a) Write a limit which represents the derivative of $f(x)$.

   (b) Evaluate the limit.

2. Coffee is being poured into the mug shown at right at a constant rate (that is, a constant volume of coffee per unit of time). Sketch a rough graph of the **depth** of the coffee in the mug as a function of time. Be sure to account for the shape of the graph in terms of concavity. Explain why your graph looks as it does using a sentence or two.