Worksheet- #10

Brightness of a star Math 124

Introduction

Suppose an astronomer models the brightness of a star by the function $B(t) = ae^{1/t}$ where t is time measured in years and a is a positive constant. Her model applies to the time interval $(-\infty, 0)$, assuming that $t = 0$ is the present moment. (Note: This problem appeared on the final exam, winter 2002.)

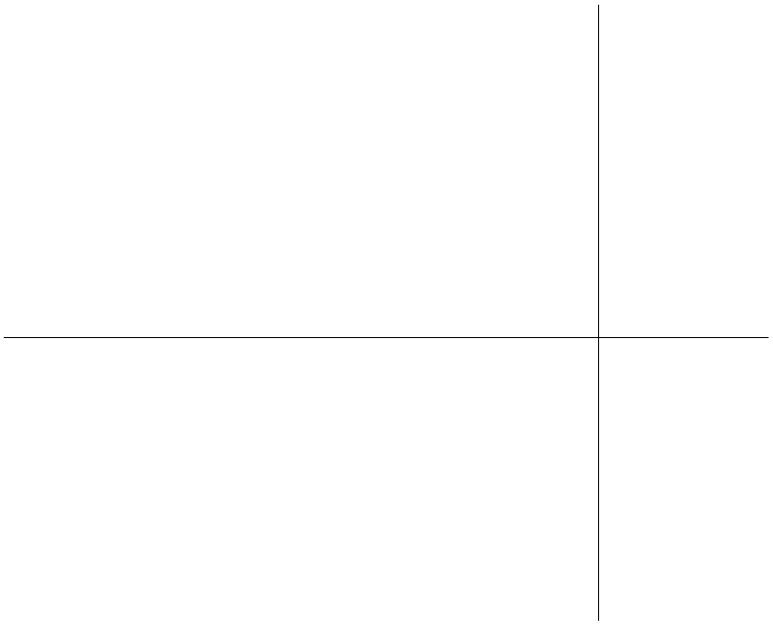
1. Find $\lim_{t\to-\infty} B(t)$. (Do not use L'Hopitals Rule.)

2. In this model, what happens to the brightness of the star as $t \to 0^-$? Show your computation.

3. Find the rate of change of the brightness of the star for $-\infty < t < 0$.

4. Compute $B''(t)$ and use it to determine the intervals in which the $rate\ of\ change$ of brightness of the star is (a) decreasing (b) increasing.

5. Sketch the graph of $B(t)$ for $-\infty < t < 0$. Make sure to indicate the coordinates of any points of interest on the graph, such as local extrema or inflection points (if there are any).



If your group has finished the worksheet, work on this problem:

Brooke is located 5 miles out from the nearest point A along a straight shoreline in her seakayak. Hunger strikes and she wants to make it to *Kono's* for lunch; see picture. Brooke can paddle 2 mph and walk 4 mph. If she paddles along a straight line course to the shore, find an equation that computes the the total time to reach lunch in terms of the location where Brooke beaches the boat. Where should she beach the kayak to eat as soon as possible?