MATH 1550 - Calculus I - Section 1 Summer 2013

HOMEWORK 6

Due at the beginning of class, Friday, July 19th

Read the questions carefully. You must show your work to get full credit.

(1) Suppose a lifeguard is standing at point A on the shoreline and spots a swimmer in distress at point B in the water. The lifeguard estimates that the swimmer is located P meters down the shoreline and Q meters out to sea (in this problem, P and Q represent constant values). The lifeguard will reach the swimmer by first running along the shoreline, then swimming to point A, as shown in the diagram. Assume that the lifeguard can run 2 m/s and swim 1 m/s. Find a formula (it should involve P and Q) that determines how far the lifeguard should run along the shoreline before jumping in the water to reach the swimmer in the least amount of time.



(2) State both parts of the Fundamental Theorem of Calculus.

(3) Find and classify the critical points of the function $A(x) = \int_3^x 2t^2 - t - 21 \, dt$. (4) Find the derivative of $A(x) = \int_{-9}^{\csc x} \frac{7}{t} - \sin^2 t + e^{2t-4} \, dt$ (5) Evaluate $\int_{\frac{\pi}{12}}^{\frac{\pi}{4}} \sec^2(2x) + \frac{5}{2x} - 7x^2 \, dx$ (6) Evaluate $\int \frac{1}{4x(\ln x)^3} \, dx$