

PROBLEM 5: CROSSING THE DESERT

UNDERGRADUATE PROBLEM SOLVING CONTEST

Due Friday, March 19, 2010 by 5:00 PM

This problem has two parts. A correct answer to either part will be considered to be a partially correct solution, while correct answers to both parts will be necessary for a fully correct solution.

(a) A man wants to cross a 100-mile desert with 200 bananas. He can carry a maximum of 100 bananas at a time, and he must eat bananas continuously at the rate of 1 banana per mile. (For example, after going $3/4$ of a mile he will have eaten $3/4$ of a banana.) At any time he may drop some of the bananas he is carrying, or pick up ones that he dropped earlier (and he may do this at any real number distance, and may drop any real number amount of bananas). What is the maximum number of bananas that he can have upon reaching the other side of the desert?

(b) What if he starts with 300 bananas?

In the spirit of the UPSC, you should not search the internet or look the solution up in a book.