2002 Problem 3

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

There are 4 runners on the New High School team. The team is planning to participate in a race in which each runner runs a mile. The team time is the sum of the individual times for the 4 runners. Assume that the individual times of the 4 runners are all independent of each other. The individual times, in minutes, of the runners in similar races are approximately normally distributed with the following means and standard deviations.

	Mean	Standard Deviation
Runner 1	4.9	0.15
Runner 2	4.7	0.16
Runner 3	4.5	0.14
Runner 4	4.8	0.15

Scoring:

E   P   I

(a) Runner 3 thinks that he can run a mile in less than 4.2 minutes in the next race. Is this likely to happen?

E   P   I

(b) The distribution of possible team times is approximately normal. What are the mean and standard deviation of this distribution?

E   P   I

(c) Suppose the team's best time to date is 18.4 minutes. What is the probability that the team will beat its own best time in the next race?

E   P   I

Total:___/4