Names:

SA421 – Simulation Modeling   Spring 2013
Asst. Prof. Nelson Uhan

Lesson 19 / Quiz 6. Basic ProModel Review

Instructions. You have the entire class period to complete this quiz. You may use your notes, homework, textbook, and files during this quiz. You must work in teams of 2 or 3. Submit only 1 quiz sheet per team.

Problem 1. Passengers arrive at the main entrance of the Bellman Air terminal, according to an exponential interarrival-time distribution with mean 1.6 minutes. The travel time from the entrance to the check-in counter is distributed uniformly between 2 and 3 minutes. 80% of passengers are traveling economy class, 20% of passengers are traveling business class. At the check-in counter, economy class passengers have a service time (in minutes) following a gamma distribution with shape value α = 14.4 and scale value β = 0.42, while business class passengers have a service time (also in minutes) following a gamma distribution with shape value α = 15.7 and scale value β = 0.54. Bellman Air is trying to determine how many agents it should have at its check-in counter.

a. Simulate the system for 16 hours with x check-in agents, for $x \in \{1, 2, 3, 4, 5, 6\}$. While doing these simulations, consider the two questions below.

b. For each x, what fraction of the passengers served wait more than 20 minutes? (Start a passenger's waiting time at the moment he or she enters the check-in counter queue.)

c. What is the minimum number of agents needed to ensure that no more than 20 passengers are waiting at the check-in counter at any time?

d. For <u>one</u> member of your team: in the top level of your SA421 submission folder on Google Drive:
   i. Create a folder called "Quiz 6".
   ii. Upload your ProModel file for this quiz into this folder.
   iii. <u>Circle your name</u> at the top of this sheet.

e. If you're done early, think about the bonus questions on the back of this sheet.

Bonus 1. In words, how would you change your model to only simulate the first 200 passengers?

Bonus 2. Suppose that you did not know that 80% of passengers travel economy class and 20% travel business class. Instead, suppose you had separate interarrival time distributions for economy class and business class passengers. In words, how would you change your model?