

## Wolff 2-19

### From Ronald W. Wolff: “stochastic modeling and the theory of queues processes”, Prentice-Hall 1989

A subway station has both local and express service, on opposite sides of the same platform. Local trains arrive every 5 minutes (constant), and express trains arrive every 15 minutes (constant), scheduled so that every third local train arrives simultaneously with an express train. Both trains stop at your destination, with transition times of 17 minutes for a local train and 11 minutes for an express train. You arrive at “random” on the station platform. Your *objective* is to minimize your expected travel time,  $E(T)$  say, from your arrival epoch at the station until you reach your destination.

- (a) What is the waiting time *distribution* until the next local train arrives? The next express train?
- (b) What is the probability that the next local train arrives alone, i.e., without an express? What is the probability that the next two local trains arrive alone? Briefly explain. (*Hint*: Interpret probabilities as fractions of time.)
- (c) If the next local train arrives alone, should you board that train or wait for an express?
- (d) Given your decision in (c), find  $E(T)$ .
- (e) If local and express trains are boarded from different platforms, on which platform should you wait? (Running between platforms is not allowed.)