Geometric and Negative Binomials

3-57. Assume that each of your calls to a popular radio station has a probability of 0.02 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent.

(a) What is the probability that your first call that connects is your tenth call?

(b) What is the probability that it requires more than five calls for you to connect?

(c) What is the mean number of calls needed to connect?

3-58. A player of a video game is confronted with a series of opponents and has an 80% probability of defeating each one. Success with any opponent is independent of previous encounters. The player continues to contest opponents until defeated.

(a) What is the probability mass function of the number of opponents contested in a game?

(b) What is the probability that a player defeats at least two opponents in a game?

c) What is the expected number of opponents contested in a game?

d) What is the probability that a player contests four or more opponents in a game?

e) What is the expected number of game plays until a player contests four or more opponents?