Probability and Statistics II Review 1

Please show your work on all problems.

1. Joe leaves his home at 7:45, and his travel time to work is uniformly distributed between 10 minutes and 20 minutes.

   (a) If he has to be at work by 8:00, what is the probability that he will be late?

   (b) What are the expected value and standard deviation for his travel time?

2. A radioactive sample emits α-particles at an average rate of 10 per second according to a Poisson process. Let W be the waiting time until the 3rd particle is emitted.

   (a) What type of distribution does W have, and what is its probability density function?

   (b) What are the expected value and variance of W?

   (c) Calculate $P(0.2 < W < 0.5)$.

3. Suppose that the cumulative distribution function of X is $F(x) = 1 - e^{-2x}$, for $x > 0$. Find the 42nd percentile of this distribution.

4. Find the 20th and 60th percentiles of the sample $9, 7, 1, 4, 11, 3, 2, 6, 12$.

5. Assume that scores on the math portion of the SAT are normally distributed with mean 508 and standard deviation 111. Find the following.

   (a) The percentage of students whose SAT math score is above 250.

   (b) The 85th percentile of SAT math scores.