Stat 401, HW 1

Problems on Moment Generating Functions

1. Suppose that X has uniform distribution on the interval $[A, B]$.
How is $Y = 2X$ distributed?

2. Suppose that X has chi-squared distribution with 3 degrees of freedom and Y has chi-squared distribution with 5 degrees of freedom and X and Y are independent. How is $W = X + Y$ distributed?

3. Suppose that X and Y have exponential distribution with parameter λ and they are independent. How is $W = X + Y$ distributed?

Problems on Random Intervals

1. Suppose that X has normal distribution with mean 5 and variance 1. Compute

$$P(5 \in (X - 1, X + 1)).$$

2. Suppose that X is as in the previous problem. Compute

$$P(2X \in (X - 1, X + 1)).$$

Note that in this second problem things are "as random as possible". You are asked to compute the probability that a *random variable* is in a *random interval*. This type of probability occurs in the study of "prediction intervals" whereas the first type of probability occurs in the study of "confidence intervals".