

Second set of Problems.

1. Let $X \sim \mathcal{N}(2, 5)$ and $Y \sim \mathcal{N}(3, 5)$ be two independent random variables. Compute $P(X > 1)$, $P(1 < X + Y < 5)$, $P(Y < 2)$. Sketch the graphs of their distribution functions.
2. A sample of 20 independent experiments gave us a sample mean of 2.2. If we know that the experiment is modelled by a normal distribution with known variance equal 2, compute a 95% percent confidence interval for the mean.
3. From a random variable X that is normally distributed we take 20 samples. From these we get that the sample mean is 1.2 and that the sample variance is 2. From theoretical reasons, we suspect that the theoretical mean is 0. Perform a hypothesis test with $\alpha = 0.05$.
4. From two independent and normally distributed random variables X, Y we obtain 20 samples (20 from X and 20 from Y). From these we get that their sample means are $\bar{x} = 1.2$, $\bar{y} = 1.3$ and that their sample variances are equal to 2. From theoretical reasons, we suspect that their population means should coincide. Perform a hypothesis test with $\alpha = 0.05$.