1. Uniform Distribution: a. Define the uniform distribution and explain its characteristics. b. A random variable X follows a uniform distribution on the interval [a, b]. Calculate the probability density function (pdf) of X and the cumulative distribution function (cdf) of X.

2. Normal Distribution: a. Describe the normal distribution and its properties. b. If a random variable X follows a normal distribution with mean $0\mu=50$ and standard deviation $\sigma=10$, calculate the probability that X lies between 40 and 60.

3. Applications of the Normal Distribution: a. Discuss two real-world applications where the normal distribution is commonly used. b. A company's daily sales follow a normal distribution with a mean of $100,000 and a standard deviation of $20,000. What is the probability that the company's daily sales exceed $120,000?

4. Normal Approximation to the Binomial Distribution: a. Explain the concept of normal approximation to the binomial distribution. b. If a binomial distribution has parameters $n=100$ and $p=0.4$, approximate the probability that the number of successes is between 35 and 45 using the normal approximation.

5. Sampling Distributions and the Central Limit Theorem: a. Define the sampling distribution of a statistic and discuss its importance in inferential statistics. b. State the central limit theorem and explain its significance in statistical inference.