

This exam consists of 4 problems (10 parts), and will be worth 60 points.

You will be allowed to use:

- a calculator to help with arithmetic. However, you will not be able to use any built-in probability or statistics functions of that calculator.
- a calculus book or integral table

Topics:

Random variables

Single variable pdfs/cdfs/expectations/probabilities

including normal, gamma, exponential problems

Normal probabilities

This part of the exam consists of 6 problems (13 parts) and is worth 75 points.

You may use a calculator on this exam, as well as your textbook and a calculus book.

Show all of your work and your answers in the space provided. Partial credit will be given on most problems, but only for proper work which is shown.

You may ask for help or clarification on problems, though I may tell you I cannot give you any more information, or I might tell you that help will cost you points.

1. (5 points each) Consider the following function:

$$g(x) = \begin{cases} 5x^4 & \text{for } 0 < x < 1 \\ 0 & \text{e.w.} \end{cases}$$

- Verify that it is a mathematically legitimate pdf.
- Find $P(x > 1/2)$
- Find the mean of this distribution
- Find the cdf for this distribution
- Find $E(3X+2)$

2. (5 points each) One of the more famous IQ tests is the Stanford-Binet test. Scores on this test are known to be normally distributed with a mean of 100 and a standard deviation of 12.

- Suppose we randomly select 1 person who has taken this test. What is the probability this person's IQ is 104 or more?
- What raw score chops off the top 15% of the population of all who have taken this test?

3. (5 points) The number of accidents at the intersection of Hancock & Elm Ave is a Poisson Process, with mean of 2 accidents per hour. Thus, if we go to that corner and sit and wait for an accident, the time we will have to wait until we see an accident is an rv W (in hours) that follows a gamma distribution with $\alpha = 1$ and $\beta = 1/2$. What is the probability we will have to wait 60 minutes or more to see the first accident?

4. (5 points) If X is a gamma(6,4) distribution, find $P(X < 16)$.