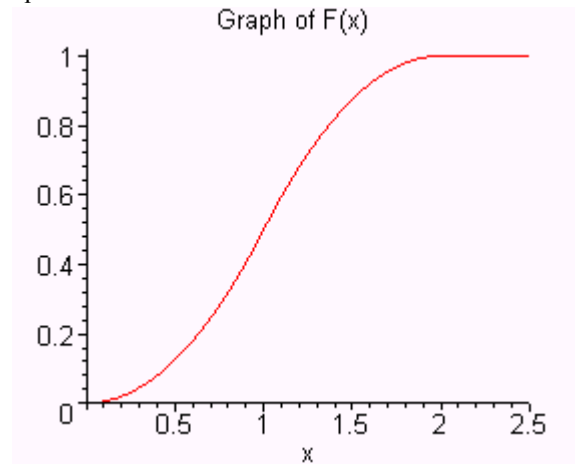


You may use the front flap and the appendices of your textbook for this quiz.

I. Suppose the continuous random variable  $X$  has the cumulative distribution function

$$F(x) = \begin{cases} 0, & x < 0 \\ x^2 / 2, & 0 \leq x < 1 \\ 1 - (2 - x)^2 / 2, & 1 \leq x < 2 \\ 1, & 2 \leq x \end{cases}$$

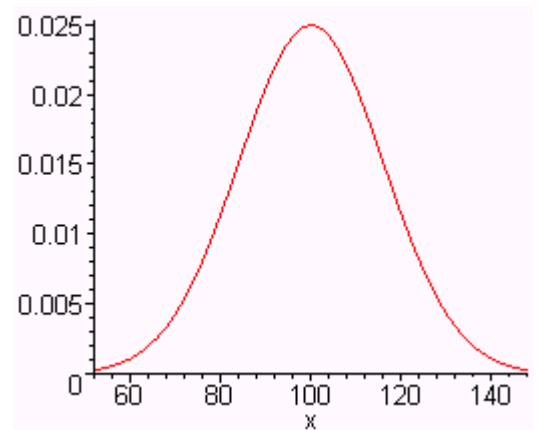
The graph of  $F$  is given to your right. Find  $P(1/2 \leq X \leq 3/2)$  and represent this probability on the graph. (4 points)



II. Telephone calls enter a college switchboard according to a Poisson process on the average of 2 calls every 3 minutes. Let the random variable  $X$  be the number of calls received between 10:00 a.m. and 10:30 a.m. and the random variable  $Y$  be the waiting time for the first call received after 10:00 a.m. How are the random variables  $X$  and  $Y$  distributed? For each random variable you should give the name of its distribution, the values of all relevant parameters for the distribution (including the possible values of the random variable), and the probability density and/or mass function of the random variable. (8 points)

III. The Stanford-Binet IQ test is normally scaled with a mean score of 100 and a standard deviation of 16. A graph of the probability density function for the scores is given below. Please answer the following: (8 points total)

(a) What is the probability that a randomly chosen person who has taken the test has a score that is less than 80 or greater than 132? Represent this probability on the given graph. (5 points)



(b) Suppose 200 people who have taken the test are randomly chosen. Let the random variable  $Y$  represent the number who have a test score that is less than 80 or greater than 132. How is the random variable  $Y$  distributed? You should give the name of the distribution and the values of all relevant parameters of the distribution. (3 points)