

SOLUTION EXTRA PROBLEM 9: EXPERT JUDGMENT

A manufacturer needs to make an assessment of the size of the potential market for a new product. A market analyst provides the following evaluations for the number of items, N , that can be sold in the first year (in thousands):

$$\Pr(N \leq 15) = 0.05$$

$$\Pr(N > 45) = 0.05$$

$$\Pr(N > 30) = 0.50$$

$$\Pr(N \leq 20) = 0.25$$

$$\Pr(N > 35) = 0.25$$

In addition, the market analyst provided the information that **at least 5,000** will be sold, but definitely **no more than 50,000**.

A. Draw an approximate continuous cumulative distribution function (CDF) using the straight line approximation for N .

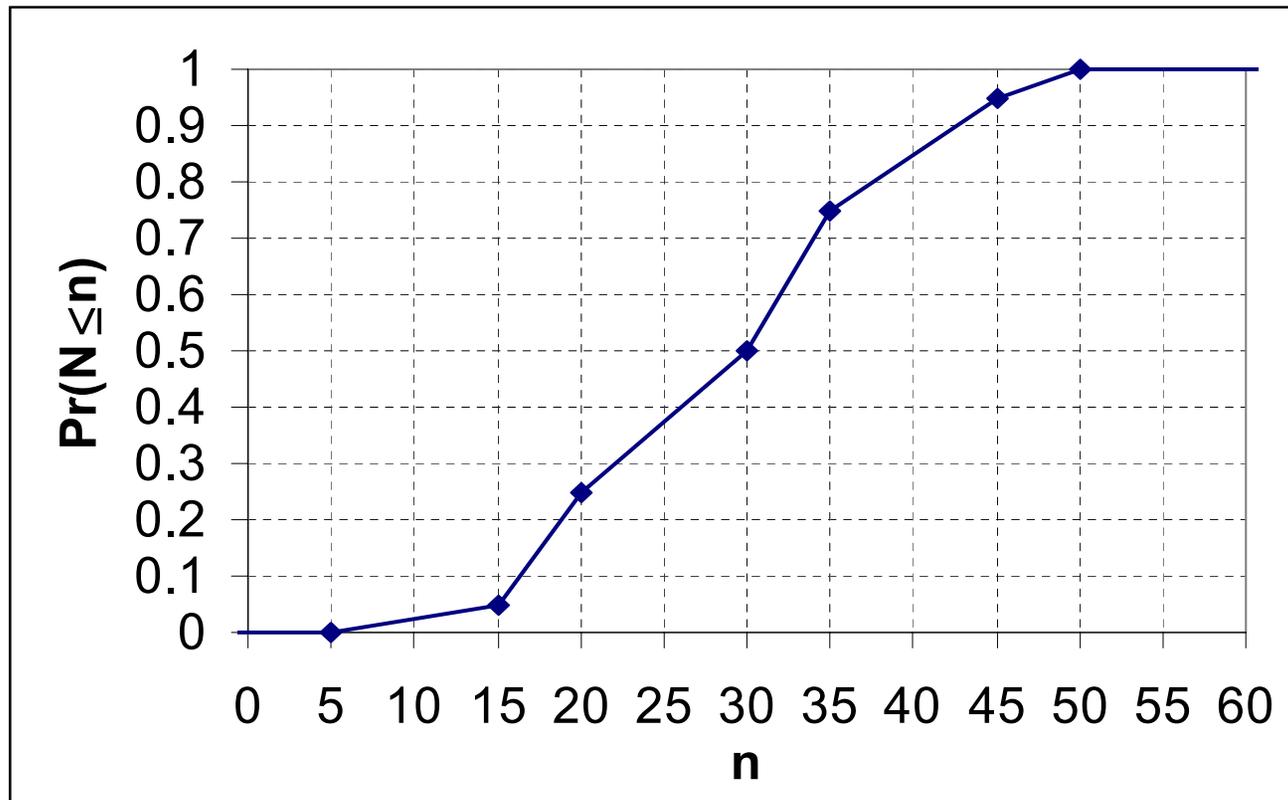
$$\Pr(N \leq 5) = 0;$$

$$\Pr(N \leq 15) = 0.05;$$

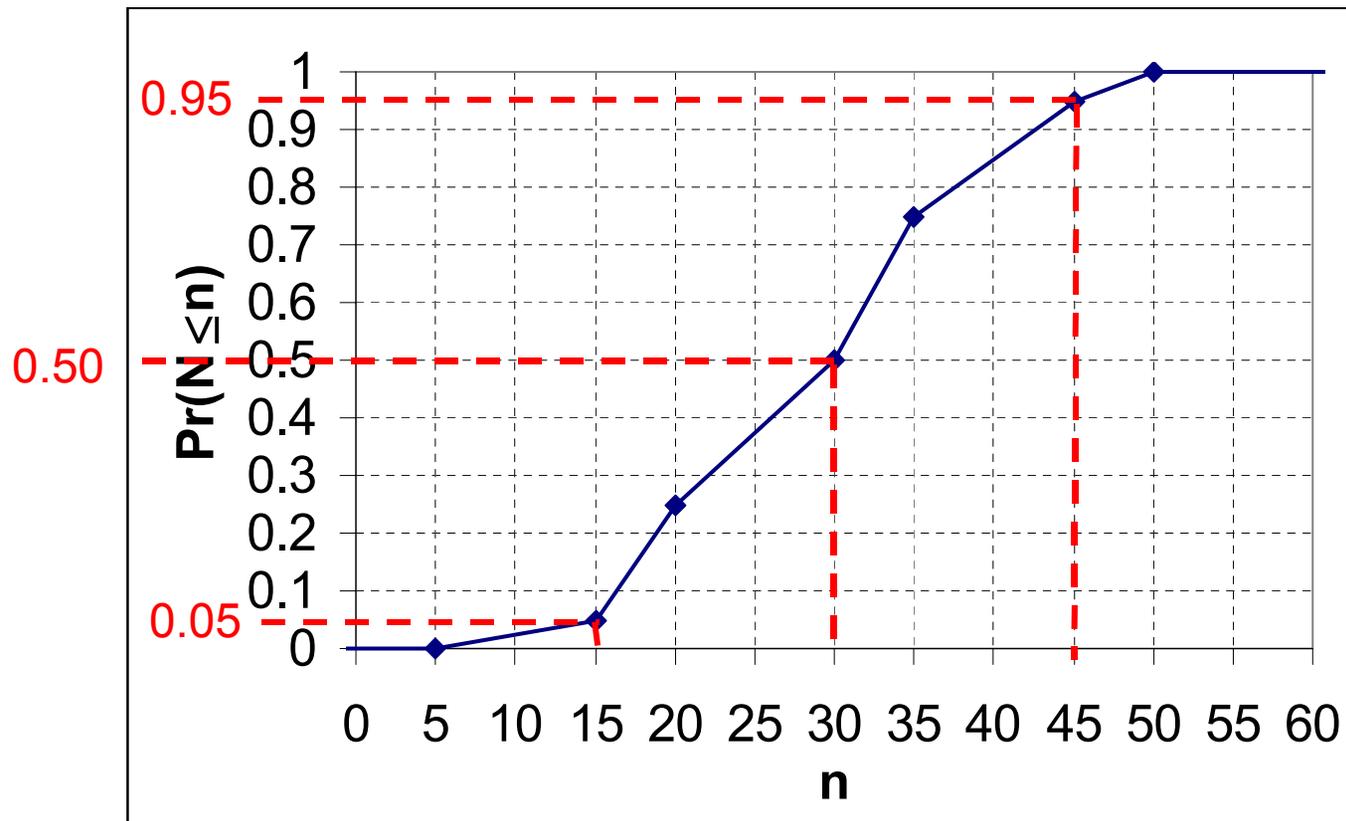
$$\Pr(N \leq 50) = 1$$

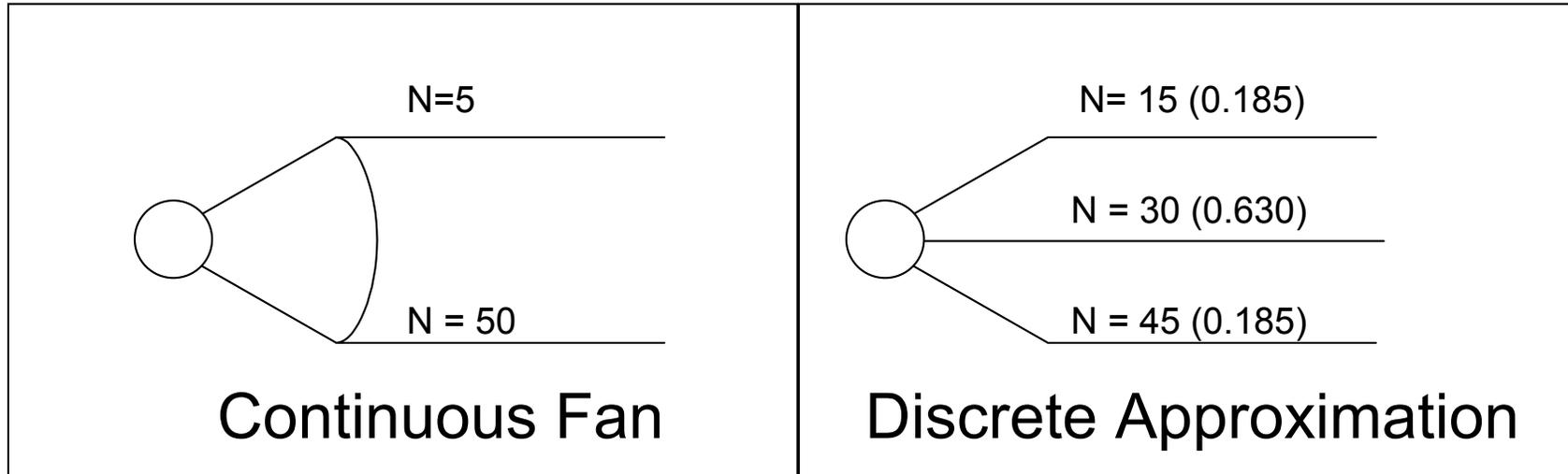
$$\Pr(N \leq 20) = 0.25;$$

$$\begin{aligned} \Pr(N > 30) = 0.50 &\Leftrightarrow \Pr(N \leq 30) = 0.50 \\ \Pr(N > 35) = 0.25 &\Leftrightarrow \Pr(N \leq 35) = 0.75 \\ \Pr(N > 45) = 0.05 &\Leftrightarrow \Pr(N \leq 45) = 0.95 \end{aligned}$$



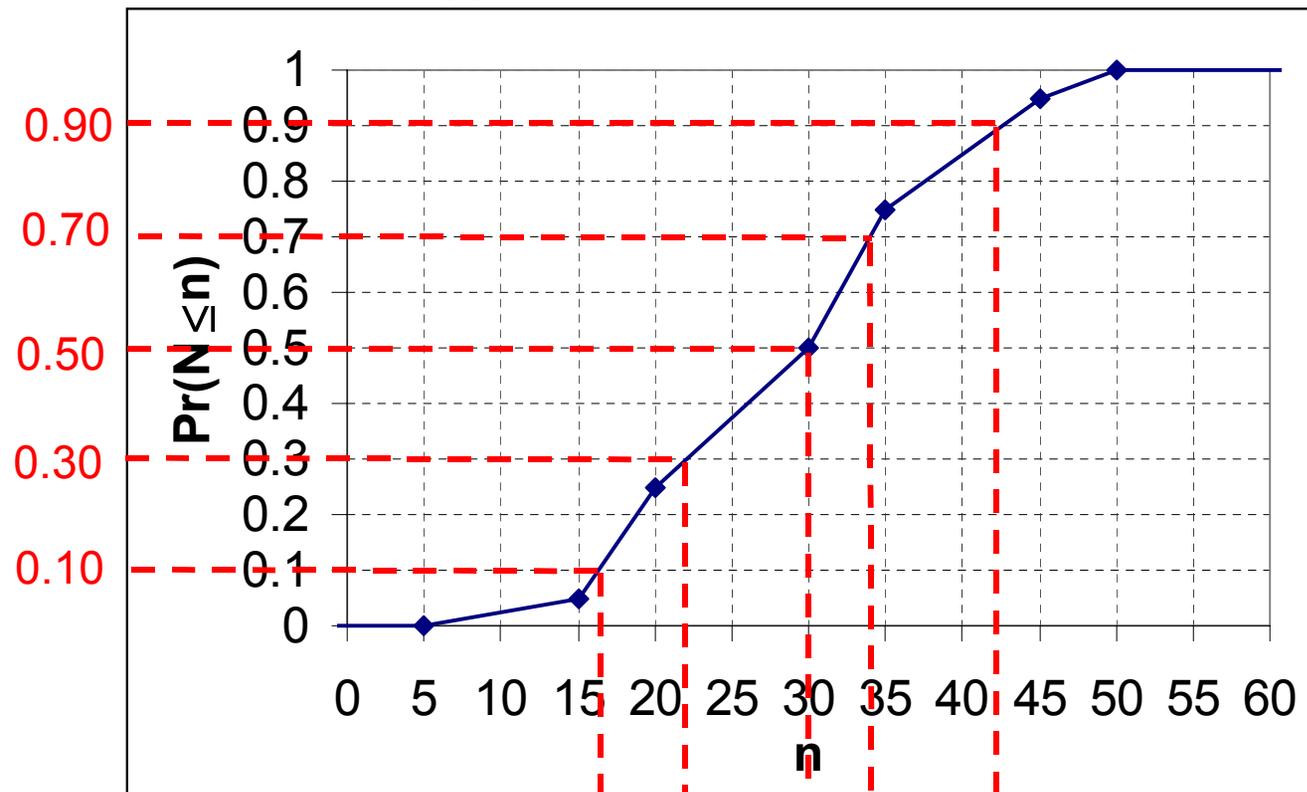
B. Construct a three-point approximation to this distribution with the extended Pearson-Tukey method. Estimate the expected demand with this approximation.





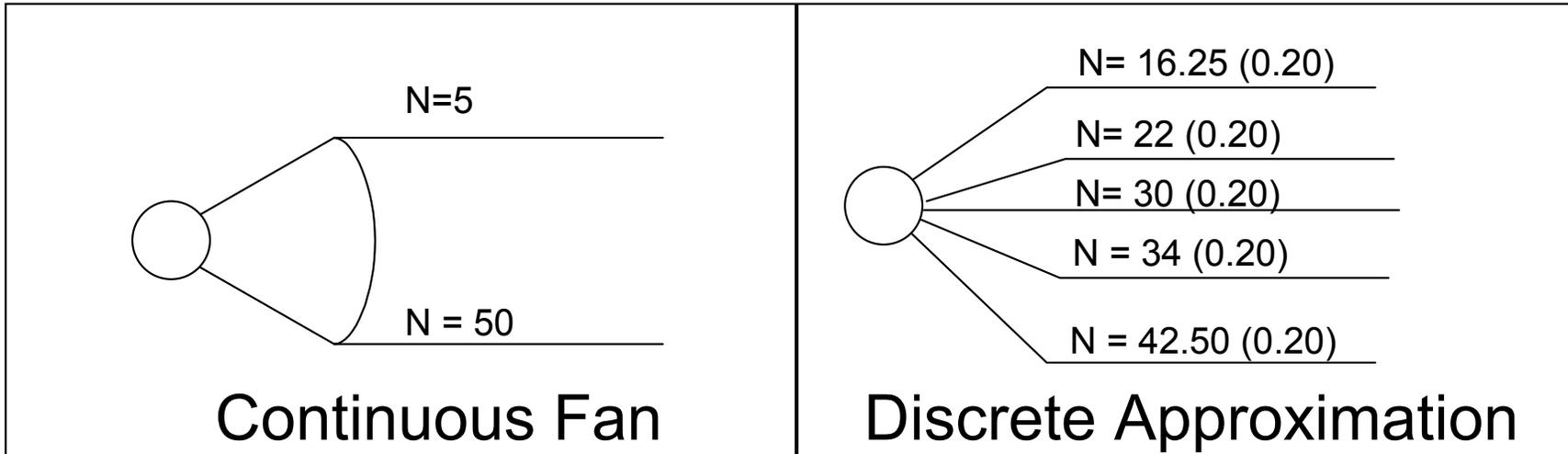
N	Pr(N=n)	N*Pr(N=n)
15	0.185	2.775
30	0.630	18.900
45	0.185	8.325
E[N]		30

C. Construct a five-point approximation with bracket medians. Estimate the expected demand with this approximation.



16.25 22 30 34 42.5

$$15 + \frac{0.10 - 0.05}{0.25 - 0.05} \times (20 - 15) = 15 + \frac{1}{4} \times (20 - 15) = 16.25$$



N	Pr(N=n)	N*Pr(N=n)
16.25	0.200	3.250
22	0.200	4.400
30	0.200	6.000
34	0.200	6.800
42.5	0.200	8.500
E[N]		28.95