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Homework based on Chapter 15, 16
Computational Probability and Statistics, Section 002
Due: 9:00 AM, Friday, Apr. 10, 2015

Question 1. We computed the height of histogram for the numbers in Homework 8, Q4.

a). Fill the following table

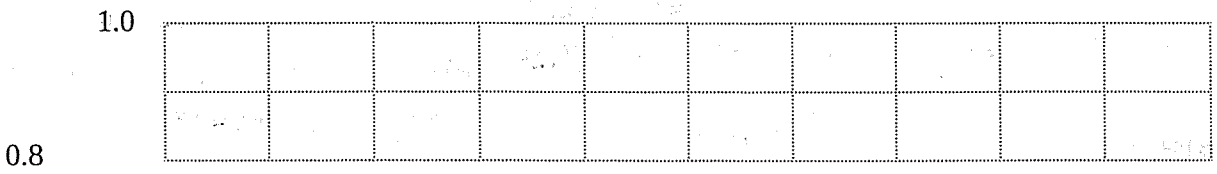
Bin	[0, 10]	(10, 20]	(20, 30]	(30, 40]	(40, 50]	(50, 60]
P(B*i*)	0.05	0.05	0.05	0.1	0.15	0
Height	0.005	0.005	0.005	0.01	0.015	0
Bin	(60, 70]	(70, 80]	(80, 90]	(90, 100]		
P(B*i*)	0.15	0.1	0.2	0.15		
Height	0.015	0.01	0.02	0.015		

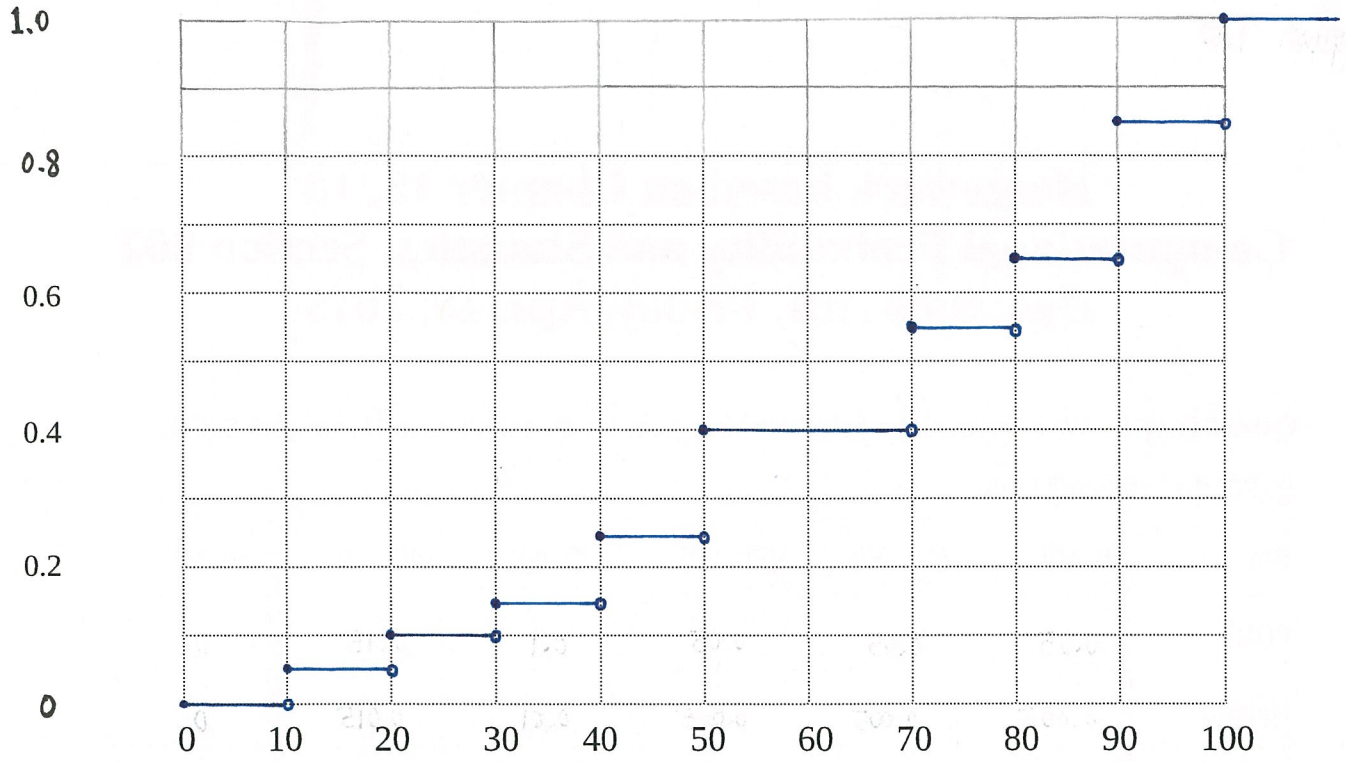
Where P(B*i*) = $\frac{number\ of\ x_j \in B_i}{n}$, Height = $\frac{number\ of\ x_j \in B_i}{n * binwidth}$

b). At the boundary of each bin, we can compute the empirical distribution function *Fn*(*t*). Fill the following table for empirical distribution function.

t	0	10	20	30	40	50	60	70	80	90	100
Fn(*t*)	0	0.05	0.1	0.15	0.25	0.4	0.4	0.55	0.65	0.85	0.1

c). Draw the empirical distribution function of the dataset in the given grid





Question 2. Recall the example about the space shuttle Challenger in Section 1.4. The following table lists the order statistics of launch temperatures during take-offs in degrees Fahrenheit, including the launch temperature on January 28, 1986.

31	53	57	58	63	66	67	67	67	68	69	70
70	70	70	72	73	75	75	76	76	78	79	81

$n=24$

a). Find the sample mean, sample variance and sample median of the data set.

b). Find the lower and upper quartiles.

c). Calculate the MAD of the data set.

d). The value 63 is the 0.2 quantile of the dataset?

e). What is the 0.4 quantile of the data set ?

a) sample mean:

$\bar{x}=\frac{31+53+57+\cdots+79+81}{24}\approx 67.9583$

sample variance:

$S^2=\frac{1}{23}\sum_{i=1}^{24}(x_i-\bar{x})^2\approx 109.6069$

sample median: $Med=70$

b) lower quartile:

$p=0.25,\ k=[p(n+1)]=6,\ \alpha=p(n+1)-k=0.25$

$\Rightarrow q_{24}(0.25)=x_{(6)}+0.25(x_{(7)}-x_{(6)})=66.25$

upper quartile:

$p=0.75,\ k=[p(n+1)]=18,\ \alpha=p(n+1)-k=0.75$

$\Rightarrow q_{24}(0.75)=x_{(18)}+0.75(x_{(19)}-x_{(18)})=75$

c) $MAD=Med(|x_1-70|,\cdots,|x_n-70|)$

$=4.5$

d) 63 is the 5th order statistic,

so 63 is the $\frac{5}{24+1}=0.2$ quantile of the da

e) $p=0.4,\ k=[p(n+1)]=10,\ \alpha=p(n+1)-k=0$

$\Rightarrow q_{24}(0.4)=x_{(10)}+0=68$