HW#7

Section 9.1 P416

2. a) discrete distribution

   b) x=2 $P(x=2)=(1/3)^{2-1}*(2/3)=2/9$

   x=0   P(x=0)=0

   c) P(x<=2)=P(x=1)+P(x=2)+0=2/3+2/9=8/9

   d) P(x>=3)=1- P(x=1)-P(x=2)=1-8/9=1/9

   e) False. P(x>3)= 1- P(x=1)-P(x=2)-P(x=3)=1-8/9-2/27=1/27

   f)

x	1	2	3	4…….
P(x)	2/3	2/9	2/27	2/81 …

3. a) x=0,1,2

   b)

x	0	1	2
P(x)	1/4	1/2	1/4

   d) Four balls. One ball is “0” , two balls “2” , one ball “2” .
   Repeat drawing one ball, write down the numbers of “0”,”1”,”2”, divided by the total times to get the experimental P(x=0), P(x=1), P(x=2).

   OR, you can put one "0" ball and one "1" ball. A single simulation consists of drawing two balls with replacement and adding the numbers. Record this total, and repeat many times.

4. a) actual & discrete

   b) using Table B.3.   01-25 success (subscriber)
   00, 26-99 not subscriber

Section 9.3 P.432

2. a) 1/4

   b) fix number n=5; correct/wrong; P=1/4 for all trials; independent;

   c) P(first right AND second right AND...AND fifth right) = (1/4) *(1/4)*(1/4)*(1/4)*(1/4) = 0.000976562

3. a) RRWWW (Probability = (1/4)*(1/4)*(3/4)*(3/4)*(3/4) = .0264672)
   RWRWW (Prob = = (1/4)*(3/4)*(1/4)*(3/4)*(3/4) = 0.0264672)

RWWRW
RWWWR
WRRWW
WRWRW
WRWWR
WWRRW
WWRWR
WWWRR

b) Sum the above probabilities = 10* 0.0264672 = .264672

6.. E(x)=np

SD of x=$(n*p*(1-p))^{0.5}$

a) E(x)=10*0.9=9

SD=$\sqrt{(10*0.9*0.1)}$=0.95

b) E=7.7 SD=2.24

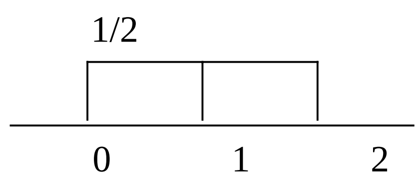
c) E=1.68 SD=1.22

d) E=3.29 SD=1.32

Section 9.6 P452

2. a) E(U)=(low value + high value)/2=1

SD of U=(high-low)/ $\sqrt{12}$=$\sqrt{3}$/3=0.577



b) P(x<1) =1*(1/2)=1/2

P(x<0.5)=1/4

3. a) E= 0.5/2=0.25 SD=0.149
   b) E= -0.125 SD=0.794
   c) E= 6.875 SD=0.36
   d) E= 16.95 SD=1.93

4. a) values lie in a interval and equally likely
   b) mean=4.5 SD=2.598

7. a) Hard to say without more information. Certainly a continuous distribution is better than a discrete since water levels rise and fall continuously. But a uniform model seems pushing it, since probably certain flood levels occur more often than others.
b) i. $P=(33-24)*(1/22)=9/22$
ii $P=(16-11)*(1/22)=5/22$
iii $P=1-(9/22)-(5/22)=4/11$ or $P=(24-16)*(1/22)=4/11$

Section 9.7 P.461

1. mean +/- 1SD or 2SD
a) $[5-1.5, 5+1.5] \rightarrow$ 68% in [3.5, 6.5]
b) $[5-3, 5+3] \rightarrow$ 95% in [2, 8]

4.. a) $P(x<10)= 0.5$
b) $P(x>10)= 0.5$
c) $P(8<x<10)= 0.34$
d) $P(6<x<12)= 0.68+0.135=0.815$

7. a) $(3.234-3)/2=0.117$
b) $(5.193-3)/2=1.0965$

Section 9.8 P.468

1. a). $P(z<1.96)=0.975$
$P(z<-1.96)=0.025$
$P(z<1.0)=0.8413$

6. a) $P(Z>z)=0.95$
$P(Z<z)=0.05$
$\Rightarrow z=-1.645$
b) $P(Z>z)=0.90$
$P(Z<z)=0.10$
$\Rightarrow z=-1.28$
c) $P(Z>z)=0.99$
$P(Z<z)=0.01$
$\Rightarrow z=-2.33$

11. a) $P(z<-a)=(1-0.95)/2=0.025$

$-a=-1.96 \Rightarrow a=1.96$

b) $P(z<-a)=(1-0.9)/2=0.05$

$-a=-1.645 \Rightarrow a=1.645$

c) $P(z<-a)=(1-0.2)/2=0.4$

$-a=-0.25 \Rightarrow a=0.25$

Section 9.9 P473

1. $\mu=70 \quad \sigma=3.1$

a) $P(x<68)=P(Z<(68-70)/3.1)$
$=P(Z<-0.65)$
$=0.2578$

b) $P(x>73.5)=1-P(x<73.5)$
$=1-P(Z<(73.5-70)/3.1)$
$=1-P(Z<1.13)$
$=1-0.8708$
$=0.1292$

c) $P(Z<z)=0.31$
$\Rightarrow z=-0.5$
$\Rightarrow (x-70)/3.1=-0.5 \Rightarrow x=68.45$

$P(Z>z)=0.69 \Rightarrow 1-P(Z<z)=0.69 \Rightarrow P(Z<z)=0.31$ so, same result as above.

2. $\mu=41$ pounds $\sigma=4$ ounces=0.25 pound

$P(x<40)=P(Z<(40-41)/0.25)=P(Z<-4)=0.000032$

$30,000,000*0.000032=96$

3.. $P(Z>2.5)=1-P(Z<2.5)=1-0.9938=0.0062=0.62\%$

$p(Z<-2.5)=0.0062$

4.. $P(Z>(5.325-5.29)/0.01)=P(Z>3.5)=1-P(Z<3.5)=0$

$P(Z<(5.275-5.29)/0.01)=P(Z<-1.5)=0.0668=6.68\%$

5.. $P(Z<(x-52)/6)=0.85$

$\Rightarrow Z=1.4=(x-52)/6 \Rightarrow x=60.4$

$P(Z<(x-52)/6)=0.15$

$\Rightarrow z=-1.4=(x-52)/6 \Rightarrow x=43.6$

7. $\mu=85$ $\sigma=2.5$

$P(x>90)=1-P(x<90)$

$=1-P(Z<(90-85)/2.5)=1-P(Z<2)=1-0.9772=0.0228$

$P(X<78)=P(Z<(78-85)/2.5)=P(Z<-2.8)=0.0026$

$P(82<X<87)=P(X<87)-P(X<82)$

$=P(Z<(87-85)/2.5)-P(Z<(82-85)/2.5)$

$=P(Z<0.8)-P(Z<-1.2)$

$=0.7881-0.1151=0.673=67.3\%$

10. . $\mu=2.75$ $\sigma=0.1$

a). $P(Z<(2.5-2.75)/0.1)=P(Z<-2.5)=0.0062$

b) $0.0062 * 1000=6.2$