

**Solutions to Homework 7**  
**Statistics 1, Fall 2009**

1. Multiple choice question see Webassign for answers.
2. Randomized problem. The answer corresponds to slips of paper marked 3,4,5 and 6. Note that  $S = \{(3,4),(3,5),(3,6),(4,3),(4,5),(4,6),(5,3),(5,4),(5,6),(6,3),(6,4),(6,5)\}$ .
  - a. The sums corresponding to each outcome are  $\{(3,4)=7,(3,5)=8,(3,6)=9,(4,3)=7,(4,5)=9,(4,6)=10,(5,3)=8,(5,4)=9,(5,6)=11,(6,3)=9,(6,4)=10,(6,5)=11\}$ . Thus  $x$  is in the set  $\{7,8,9,10,11\}$ .
  - b. The differences are  $\{(3,4)=-1,(3,5)=-2,(3,6)=-3,(4,3)=1,(4,5)=-1,(4,6)=-2,(5,3)=2,(5,4)=1,(5,6)=-1,(6,3)=3,(6,4)=2,(6,5)=1\}$ . Thus  $y$  is in the set  $\{-3,-2,-1,1,2,3\}$
  - c. The number that show an even  $\{(3,4)=1,(3,5)=0,(3,6)=1,(4,3)=1,(4,5)=1,(4,6)=2,(5,3)=0,(5,4)=1,(5,6)=1,(6,3)=1,(6,4)=2,(6,5)=1\}$ . Thus,  $z$  is in the set  $\{0,1,2\}$ .
  - d. Similarly we find that the number of slips that show a 5 is either 0 or 1.

3.

x	1	2	3	4	5	6	7
p(x)	.04	.04	.08	.25	.36	.16	.07

- a.  $P(X=4)=0.25$
  - b.  $P(X \leq 4) = .04+.04+.08+.25=0.41$
  - c.  $P(\text{at most 5 courses}) = .04+.04+.08+.25+0.36=0.77$
  - d.  $P(\text{at least 5 courses}) = .36+.16+.07=0.59$ ;  $P(\text{more than 5 courses}) = .16+.07=0.23$
  - e.  $P(3 \leq X \leq 6) = .08+.25+.36+.16=0.85$ ;  $P(3 < X < 6) = .25+.36=0.61$
4. Randomized problems. Here, 60% of requests are for domestic (D) and 40% are for international (I) flights.  $X =$  number of requests among 3 that are for domestic

Value of x	Calculation	Probability
0	$P(\text{III})=(.4)(.4)(.4)$	0.064
1	$P(\{DII,IDI,IID\})=.6(.4)(.4)+.4(.6)(.4)+.4(.4)(.6)$	0.288
2	$P(\{IDD,DID,DDI\})=3*(.4)(.6)(.6)$	0.432
3	$P(\text{DDD})=.6(.6)(.6)$	0.216

5.

a.

x	p(x)	x*p(x)
0	0.54	0
1	0.12	0.12
2	0.07	0.14
3	0.05	0.15
4	0.22	0.88
$\mu =$		1.29

- b.  $P(X > \mu) = P(X > 1.29) = .07+.05+.22=0.34$

6.

x	p(x)	(x- $\mu$ )	(x- $\mu$ ) <sup>2</sup> · p(x)
0	0.56	0-1.22=-1.22	0.833504
1	0.13	1-1.22=-0.22	0.006292
2	0.05	2-1.22=0.78	0.03042
3	0.05	3-1.22=1.78	0.15842
4	0.21	4-1.22=2.78	1.622964
			2.6516

$$\sigma^2 = 2.6516$$

$$\sigma = \sqrt{2.6516} = 1.6284$$