Extra Credit sec. 9

3/18/08

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1. a.) expected:

	Aa	aa
expected:	70	10

b.) $\frac{(16-20)^2}{20} = .8$ $\frac{(66-70)^2}{70} = .23$

$\frac{(18-10)^2}{10} = 6.4$ $.8 + 6.4 + .23 = \boxed{7.43}$

2. a.)

	1	2	3	4	5	6
observed:	18	22	16	24	21	19
expected:	20	20	20	20	20	20

$\frac{(18-20)^2}{20} = .2$ $\frac{(22-20)^2}{20} = .2$

$\frac{(16-20)^2}{20} = .8$ $\frac{(24-20)^2}{20} = .8$

$\frac{(21-20)^2}{20} = .05$ $\frac{(19-20)^2}{20} = .05$

$.2 + .2 + .8 + .8 + .05 + .05 = \boxed{2.1}$

b.) DF = (6 - 1) = 5 degrees of freedom

c.) The closest table entry to 2.1 is 9.236. This tells us there is around .10 probability.

d.) There is a .83514 approximate chance that a chi-square greater than (a) will occur just by chance if the die is fair.

e.) Since our probability is much bigger than .10 we cannot be suspicious of the die.

3. a.)

	1	2	3	4	5	6
observed:	25	15	28	12	27	13
expected:	20	20	20	20	20	20

#3 b.) DF = (6-1) = 5 Degrees of freedom

$\frac{(25-20)^2}{20} = 1.25$ $\frac{(15-20)^2}{20} = 1.25$

$\frac{(28-20)^2}{20} = 3.2$ $\frac{(12-20)^2}{20} = 3.2$

$\frac{(27-20)^2}{20} = 2.45$ $\frac{(13-20)^2}{20} = 2.45$

$1.25 + 1.25 + 3.2 + 3.2 + 2.45 + 2.45 = \boxed{13.8}$

c.) The closest table entry to 13.8 is 12.833. This tells us there is is around .025 probability.

d.) There is a .016931 approximate chance that a chi-square greater than (a) will occur just by chance if the die is fair.

e.) The chi-square method based on 120 tosses detects this tampering. I know this because the probalities are much closer and are less than .05, when most are always greater than .05.

4. a.)

	Heads	Tails
model probability	1/2	1/2
observed counts	56	44
expected counts under the model	50	50

$\frac{(56-50)^2}{50} = .72$ $\frac{(44-50)^2}{50} = .72$

$.72 + .72 = 1.44$

b.) DF = (2-1) = 1 degree of freedom

c.) The closest table entry to 1.44 is 2.706. This tells us there is around .10 probability d.) There is a .23014 approximate chance that a chi-square greater than (a) will occur just by chance if the coin is fair.

e.) Since our probabilty is higher than .1 we cannot be suspicious.