Question 1.

a.) H_0: there is NO relationship
   H_1: there IS a relationship

b.)
Observed

	Africa	Asia	South America	Totals	
Malaria A	14	31	45	**90**	
Malaria B	5	2	53	**60**	
Malaria C	45	53	2	**100**	
column totals	**64**	**86**	**100**		
N	250				

Expected

	Africa	Asia	South America	Totals	
Malaria A	23.04	30.96	36	**90**	
Malaria B	15.36	20.64	24	**60**	
Malaria C	25.6	34.4	40	**100**	
column totals	**64**	**86**	**100**		
N	250				

Observed	Expected	(O-E)^2	(O-E)^2/E
14	23.04	81.7216	3.546944444
31	30.96	0.0016	5.16796E-05
45	36	81	2.25
5	15.36	107.3296	6.987604167
2	20.64	347.4496	16.83379845
53	24	841	35.04166667
45	25.6	376.36	14.7015625
53	34.4	345.96	10.05697674
2	40	1444	36.1
	Statistic =	Sum =	125.5186047

Degree of Freedom = (num Rows -1)(num column -1)
              = (3-1)(3-1)
              = 4

$\chi^2 = 125.5186$

$\alpha = 0.05$, one-tailed chi-squared (4)

Rejection Region   Critical value of $\chi^2(4;0.05) = 9.49$.

p-value: $P(\chi^2(4) > 125.519) \ll 0.001$

Conclusion:

Observed test statistic (125.519) is in the rejection region so can reject H_0 in favour of H_1 at the 5% significance level, i.e. there is a relationship between region and malaria type (but we don't know what it is!)

Question 2.

H_0: the distribution is uniform
H_1: the distribution is not uniform

	Observed	Expected	(O-E)^2	(O-E)^2/E
1	24	20	16	0.8
2	15	20	25	1.25
3	27	20	49	2.45
4	17	20	9	0.45
5	22	20	4	0.2
6	15	20	25	1.25
Total	120	120	Sum =	6.4

Note Expected frequency = N/6 = 120/6 = 20

Degrees of freedom = (k-1) = (6-1) = 5

$P(\chi^2(5) > 6.4) = 0.269218$

The rejection region for $\chi^2(5; 0.01)$ is approximately 15.09 which is greater than our observed statistic.

Conclusion: The calculated p-value is greater than the significance level so we cannot reject the null hypothesis in favour of the alternative at this significance level.