

Chi Squared Test IB Questions 2013

Name: _____

1. Manuel conducts a survey on a random sample of 751 people to see which television programme type they watch most from the following: Drama, Comedy, Film, News. The results are as follows.

	Drama	Comedy	Film	News
Males under 25	22	65	90	35
Males 25 and over	36	54	67	17
Females under 25	22	59	82	15
Females 25 and over	64	39	38	46

Manuel decides to ignore the ages and to test at the 5% level of significance whether the most watched programme type is independent of **gender**.

- (a) Draw a table with 2 rows and 4 columns of data so that Manuel can perform a chi-squared test.

(3)

- (b) State Manuel's null hypothesis and alternative hypothesis.

(1)

- (c) Find the expected frequency for the number of females who had "Comedy" as their most-watched programme type. Give your answer to the nearest whole number.

(2)

- (d) Using your graphic display calculator, or otherwise, find the chi-squared statistic for Manuel's data.

(3)

- (e) (i) State the number of degrees of freedom available for this calculation.

- (ii) The critical value for Manuel's test is 7.815. Using this or the p-value, state his conclusion with a reason.

(2)

(Total 11 marks)

2. The veterinarian has gathered the following data about the weight of dogs and the weight of their puppies.

		Dog		Total
		Heavy	Light	
Puppy	Heavy	36	27	63
	Light	22	35	57
	Total	58	62	120

The veterinarian wishes to test the following hypotheses.

H_0 : A puppy's weight is independent of its parent's weight.

H_1 : A puppy's weight is related to the weight of its parent.

- (a) The table below sets out the elements required to calculate the χ^2 value for this data.

	f_o	f_e	$f_e - f_o$	$(f_e - f_o)^2$	$(f_e - f_o)^2 / f_e$
heavy/heavy	36	30.45	-5.55	30.8025	1.012
heavy/light	27	32.55	5.55	30.8025	0.946
light/heavy	22	27.55	5.55	30.8025	1.118
light/light	35	a	b	c	d

- (i) Write down the values of a , b , c , and d . (4)
- (ii) What is the value of χ^2_{calc} for this data? (1)
- (iii) How many degrees of freedom exist for the contingency table? (1)
- (b) The critical value of χ^2 for the 5% significance level is 3.84. Using this or the p-value, say if H_0 should be accepted? Explain why. (2)

(2)
(Total 8 marks)