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| <b>Name</b>  |  |
| <b>Date</b>  |  |
| <b>Class</b> |  |
| <b>Mark</b>  |  |

**Teacher Comments/Notes:**

# A Level Further Maths

## Further Stats 1 – Year 1

### Introduction to Goodness of Fit - Solutions

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**Instructions:**

- Answer all questions.
- You may use a calculator.
- The booklet 'Mathematical Formulae and Statistical Tables' may be used.

**Information:**

- There are 7 questions within this worksheet.

**Advice:**

- Check your answers against the model solutions found on our website.
- You can find video examples for questions featured within this worksheet over on our website or by visiting our YouTube channel.



1.

(a)  $H_0$ : The die is fair.

$H_1$ : The die is not fair.

(b) Expected frequency for each outcome:  $180 \div 6 = 30$ .

$$\chi^2 = \frac{(35 - 30)^2 + (30 - 30)^2 + (23 - 30)^2 + (28 - 30)^2 + (35 - 30)^2 + (29 - 30)^2}{30} = \boxed{3.47}$$

2.

(a)  $H_0$ : Students are equally distributed across the four courses.

$H_1$ : Students are not equally distributed across the four courses.

(b) Expected frequency for each course:  $600 \div 4 = 150$

(c)

$$\chi^2 = \frac{(180 - 150)^2 + (140 - 150)^2 + (130 - 150)^2 + (150 - 150)^2}{150} = \boxed{9.33}$$

3.

(a) Expected frequencies: renewed =  $150(0.7) = 105$

Did not renew =  $150(0.3) = 45$

(b)  $H_0: p = 0.7$

$H_1: p \neq 0.7$ , where  $p$  is the probability that a customer renews.

(c)

$$\chi^2 = \frac{(96 - 105)^2}{105} + \frac{(54 - 45)^2}{45} = \boxed{2.57}$$



4.

(a)  $6.251$

(b)  $15.507$

(c)  $12.833$

5.  $21.026$

6.  $y = 4.404$

7.  $10.645$