MAU11S02 Group A1 Quiz 09 9am 3/4/19 ANSWERS

Rules and procedures.
1. Answers must be handed up at the end of the tutorial, no other time. **2.** Attempt 3 questions. Only *your first three answers* will be marked. **3.** Each question carries 10 marks, so the maximum quiz mark is 30. **4.** Marked quizzes will be returned, and answers published, the following week. **5.** If a particular method of solution is stipulated, you get no marks if you don't use it. **6.** The (9) quizzes will contribute 20% to your overall mark. **7.** You are allowed to collaborate and compare answers during the tutorial. **8.** ***Show all work.*** No marks will be given for answers which do not show the calculations.

Answer 1. Distribution

k	2	3	4	5	6	7	8
p_k	$\frac{1}{16}$	$\frac{2}{16}$	$\frac{3}{16}$	$\frac{4}{16}$	$\frac{3}{16}$	$\frac{2}{16}$	$\frac{1}{16}$

$$\mu = \frac{1\times 2+2\times 3+3\times 4+4\times 5+3\times 6+2\times 7+1\times 8}{16} = 5$$
$$\sigma^2 = 2\times\frac{1\times 9+2\times 4+3\times 1}{16} = 2.5$$

Answer 2. Sample mean 5.0367 sample variance 11.4297 sdev 3.3808

Answer 3. $n = 9$, Student's t_8 , α given as 1.8600

$$\left|\sqrt{9}\frac{5.0367-\mu}{3.3808}\right| \le \alpha$$
$$|5.0367-\mu| \le \alpha\frac{3.3808}{3.0000}$$
$$\mu \in [5.0367 \mp 3.3808\alpha]$$
$$\alpha = 1.8600$$
$$2.9406 \le \mu \le 7.1328$$

Answer 4.

$$(n-1)\frac{S^2}{\sigma^2} \sim \chi^2_{n-1}$$

$$8 \times \frac{S^2}{\sigma^2} \sim \chi^2_8$$

$$8 \times S^2 = 91.4385$$

$$90\%\ 2\ \text{tail cutoff}: \ [2.7326,\ 15.5070]$$

$$\frac{91.4385}{\sigma^2} \in [2.7326, 15.5070]$$

$$\sigma^2 \in [5.8966, 33.4621] \quad 90\%\ \text{confidence}$$

$$\sigma \in [2.4283, 5.7846] \quad 90\%\ \text{confidence}$$

Answer 5.

k	3	4	5	6	7
p_k	$\frac{2}{12}$	$\frac{2}{12}$	$\frac{4}{12}$	$\frac{2}{12}$	$\frac{2}{12}$

Mean

$$\mu = \frac{3 \times 2 + 4 \times 2 + 5 \times 4 + 6 \times 2 + 7 \times 2}{12} = 5$$

Variance

$$\sigma^2 = 2 \times \frac{4 \times 2 + 1 \times 2}{12} = 5/3.$$