MAU11S02 Group A2 Quiz 09 3pm 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	9	10
p_k	$\frac{1}{25}$	$\frac{2}{25}$	$\frac{3}{25}$	$\frac{4}{25}$	$\frac{5}{25}$	$\frac{4}{25}$	$\frac{3}{25}$	$\frac{2}{25}$	$\frac{1}{25}$

$$\mu = \frac{1\times 2+2\times 3+3\times 4+4\times 5+5\times 6+4\times 7+3\times 8+2\times 9+1\times 10}{25} = 6$$

$$\sigma^2 = 2\times\frac{1\times 16+2\times 9+3\times 4+4\times 1}{25} = 4$$

Answer 2. Sample mean 2.0371 sample variance 0.5380 sdev 0.7335

Answer 3. $n = 7$, Student's t_6 , α given as 2.4470

$$\left|\sqrt{7}\frac{2.0371-\mu}{0.7335}\right| \le \alpha$$

$$|2.0371-\mu| \le \alpha\frac{0.7335}{2.6458}$$

$$\mu \in [2.0371 \mp 0.7335\alpha]$$

$$\alpha = 2.4470$$

$$1.3587 \le \mu \le 2.7155$$

Answer 4.

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

$$6 \times \frac{S^2}{\sigma^2} \sim \chi^2_6$$

$$6 \times S^2 = 3.2281$$

$$95\% \text{ 2 tail cutoff}: \ [1.2373, \ 14.4490]$$

$$\frac{3.2281}{\sigma^2} \in [1.2373, 14.4490]$$

$$\sigma^2 \in [0.2234, 2.6090] \quad 95\% \text{ confidence}$$

$$\sigma \in [0.4727, 1.6152] \quad 95\% \text{ confidence}$$

Answer 5.

k	3	4	5	6	7	8	9
p_k	$\frac{2}{20}$	$\frac{2}{20}$	$\frac{4}{20}$	$\frac{4}{20}$	$\frac{4}{20}$	$\frac{2}{20}$	$\frac{2}{20}$

Mean

$$\mu = \frac{3 \times 2 + 4 \times 2 + 5 \times 4 + 6 \times 4 + 7 \times 4 + 8 \times 2 + 9 \times 2}{20} = 6$$

Variance

$$\sigma^2 = 2 \times \frac{9 \times 2 + 4 \times 2 + 1 \times 4}{20} = 3$$