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| Ministry of Higher Education & Scientific Research  Salahaddin University-Erbil  College of Administration and Economics  Department: Statistic  Stage: Third Year | Final Exam  2021 – 2022 | Subject: Decision Theory  Date: 24 / 5 / 2022  Time: 3 Hours  First Trial |

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| --- | --- | --- | --- |
|  | Θ1 | Θ2 | Θ3 |
| d1 | 2 | 2 | 7 |
| d2 | 0 | 7 | 2 |
| d3 | 6 | 5 | 4 |

**Q1** /consider the following Standard.utility T.

And you have the following information

P (Θ1) =P (Θ2) = P (Z1/ Θ2) = 1 / 3

P (Z1/ Θ1) = P (Z1 / Θ3) = 2 /3

**Find */*** If (Z1) is known, what is the Bayes decision depending on the posterior for the state of nature and Bayes utility (15 Mark)



**Q2**/ If the prior dist. for the state of nature is exponential dist. With parameter (λ)



And the utility function is U ( d, θ ) = - | d – θ Find : The Bayes decision (10 Mark)

**Q3/ A/** If the probability density function of Gamma dist. Is :



If 1 - α = 1, β = θ 2- α = (n / 2 ) , β = 2

Find / The probability density function and Mean and Variance

**B/** X ~ N() normal distribution Find 1- The P. d. f. Of X equal one

2- Write the Mean and Var. of X (20 Mark)

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| --- | --- | --- | --- |
|  | θ1 | θ2 | θ3 |
| D1 | 4 | 1 | 0 |
| D2 | 3 | 2 | 1 |
| D3 | 2 | 2 | 3 |

**Q4**/ consider the following Standard utility Table

If P (θ1) = P (θ2), P (θ1) =2 P (θ3)

Find/ The Bayes decision (15 Mark)

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| Huda Qardagh Y.  Lecturer | Good Luck | Dr.Bekhal S. Sdiq  Head of department |