MAP30#2

Question 1 — Type II/item censoring with replacement

```
n = 5
t0 = 8760;
τ = n × t0;
r = 3;
α = 0.1;

Quantile[ChiSquareDistribution[2 * r], α / 2]
Quantile[ChiSquareDistribution[2 * r + 2], 1 - α / 2]

λL = Quantile[ChiSquareDistribution[2 * r], α / 2] / (2 * τ)
λU = Quantile[ChiSquareDistribution[2 * r + 2], 1 - α / 2] / (2 * τ)

1 / λU
1 / λL

(* Using the tables *)
1.635 / (2 × 5 × 8760)
15.51 / (2 × 5 × 8760)
1 / (15.51 / (2 × 5 × 8760))
1 / (1.635 / (2 × 5 × 8760))
```

```
5

1.63538

15.5073

0.0000186688

0.000177024

5648.95

53 565.4

0.0000186644

0.000177055

5647.97

53 578.
```

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Question 3

```
λ0 = 0.25;
k = 1;
x = 1;
χ[z_, λ_] = PDF[PoissonDistribution[λ], z];
β[z_, λ_] = CDF[PoissonDistribution[λ], z];
Q[λ_] = Table[If[j == 0, β[k - i, λ], χ[k + j - i, λ]],
    {i, 0, x}, {j, 0, x}];
um = Table[1, {i, 0, x}];
MatrixForm[Q[λ0]]
(* Requested probability *)
Round[(Q[λ0].um)[[1]], 0.0001]

(* In-control ARL *)
ID = IdentityMatrix[x + 1];
M[λ_] := Inverse[ID - Q[λ]];
umμ = Table[1, {i, 0, x}];
ARL[i_, λ_] := Table[If[j == i, 1, 0], {j, 0, x}] . M[λ] . um;
ARL[0, λ0]
```

$$\begin{pmatrix} 0.973501 & 0.0243375 \\ 0.778801 & 0.1947 \end{pmatrix}$$

```
0.9978

347.773
```