

Reliability of a Car

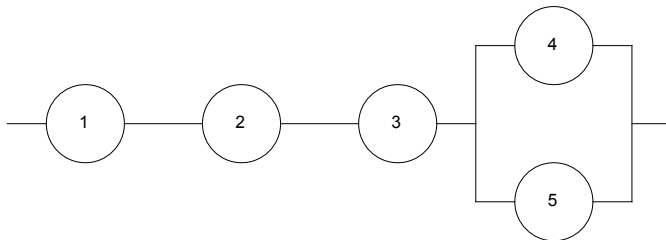
```
Show[Graphics[{
  Circle[{-10, 0}, 1],
  Circle[{-6, 0}, 1],
  Circle[{-2, 0}, 1],
  Circle[{2, 2}, 1],
  Circle[{2, -2}, 1],

  Text["1", {-10, 0}],
  Text["2", {-6, 0}],
  Text["3", {-2, 0}],
  Text["4", {2, 2}],
  Text["5", {2, -2}],

  Line[{{-12, 0}, {-11, 0}}],
  Line[{{-9, 0}, {-7, 0}}],
  Line[{{-5, 0}, {-3, 0}}],
  Line[{{-1, 0}, {0, 0}}],
  Line[{{4, 0}, {5, 0}}],

  Line[{{0, -2}, {0, 2}}],
  Line[{{4, -2}, {4, 2}}],

  Line[{{0, 2}, {1, 2}}],
  Line[{{3, 2}, {4, 2}}],
  Line[{{0, -2}, {1, -2}}],
  Line[{{3, -2}, {4, -2}}]
}]]
```

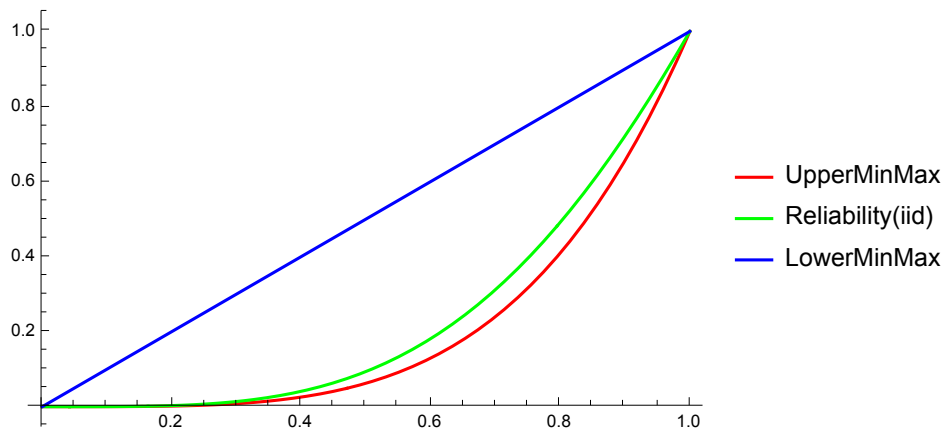


MAP30#1

Question 1

```
ClearAll["Global`*"]
dist = BernoulliDistribution[p];
Rcar = ReliabilityDistribution[X1 & X2 & X3 & (X4 ∨ X5),
  {{X1, dist}, {X2, dist}, {X3, dist}, {X4, dist}, {X5, dist}}];
r[p_] = FullSimplify[Mean[Rcar]]
- (-2 + p) p4
```

```
Plot[{p^4, r[p], p}, {p, 0, 1},
  PlotLegends ->
    Placed[{"UpperMinMax", "Reliability(iid)", "LowerMinMax"}, Right],
  PlotStyle -> {Red, Green, Blue}]
```



Question 2

```
dist = ExponentialDistribution[λ];
Rcar = ReliabilityDistribution[X1 & X2 & X3 & (X4 ∨ X5),
  {{X1, dist}, {X2, dist}, {X3, dist}, {X4, dist}, {X5, dist}}];
FullSimplify[SurvivalFunction[Rcar, t]]
Mean[Rcar]
```

$$\begin{cases} 1 & t < 0 \\ e^{-5t\lambda} (-1 + 2e^{t\lambda}) & \text{True} \end{cases}$$

$$\frac{3}{10\lambda}$$