Quiz 3 - Solution ECE 333 10/07/21

Q2.1) False; the turbine does not deliver any power for wind speeds below the cut-in speed.

Q2.2) False; it is impossible to extract 100% of power in wind as rotor spills high speed winds and the limited energy in low speed wind is lost

Q3.1) $1.91 \times (6.283)^3 = 473.7$

$\Rightarrow$ The co-worker assumed that the wind speed is Rayleigh-distributed.

Q3.2) $\bar{P} = \frac{1}{2} \rho A \left(1.91 \bar{V}^3\right) \times \eta$

$= \frac{1}{2} (1.2) \left(\frac{\pi}{4} \times 80^2\right) \left(1.91 \times 6.283^3\right) \times 0.35$

$= 500$ kW Ans

Q3.3) Capacity factor $= \frac{3942}{1500 \times 8760} = \frac{450}{1500}$

$= 0.3$ Ans.