5.1.3.

One hundred stations on a pure Aloha network share a 1 Mbps channel. If frames are 1000 bits long, find the throughput if each station is sending 10 frames/s

$T_{tx} = \frac{S_f}{R} = \frac{1000\,b}{1\,Mb/s} = 1\,ms$

$\lambda_{node} = 10\ \frac{frame}{s} \Rightarrow \lambda = n \cdot \lambda_{node} = 100 \cdot 10\ \frac{frame}{s} = 1000\ \frac{frame}{s}$

$G = \lambda \cdot T_{tx} = 1\,ms \cdot 1000\ \frac{1}{s} = 1$

$\eta = G e^{-2G} = e^{-2} = 0.1353$

Throughput $= R \cdot \eta = 1\ Mbps \cdot 0.1353 = 135.3\ kbps$

5.1.4.

Repeat for slotted Aloha

$T_{tx} = 1\,ms$; $G = 1$; $\eta = G e^{-G} = e^{-1} = 0.3679$

Throughput $= R \cdot \eta_{SA} = 1\ Mbps \cdot 0.3679 = 367.9\ kbps$