Fibre design problem 1

Assume a system with the following parameters

- Fibre Dispersion D = 17ps/nm.km
- Source Linewidth = 1 MHz
- Wavelength = 1550nm
- Receiver sensitivity -30dBm at 1 Gbit/s at 1550 nm
- Operating margin 3dB
- Fibre losses: 0.2dB/km

Pt: 0 ~ 10 dBm Splice loss: 1dB

- What is the length limit when considering losses at 1Gb/s and 10 Gb/s?

  (Hint: To move to 10 Gb/s consider how SNR at the receiver changes with BW and how a change of a factor 10 in bandwidth would change the sensitivity)

- What are the linewidths for 1Gbit/s and 10Gbit/s transmission?
  (Hint: State the assumption you are making on modulation format and filtering)

  bandwidth equal to bitrate
- What is the dispersion limit in term of link length at 1 Gbit/s and 10Gb/s?

- How does it compare to the loss limit of the system at both data rates?