

Major Task



Program: communication

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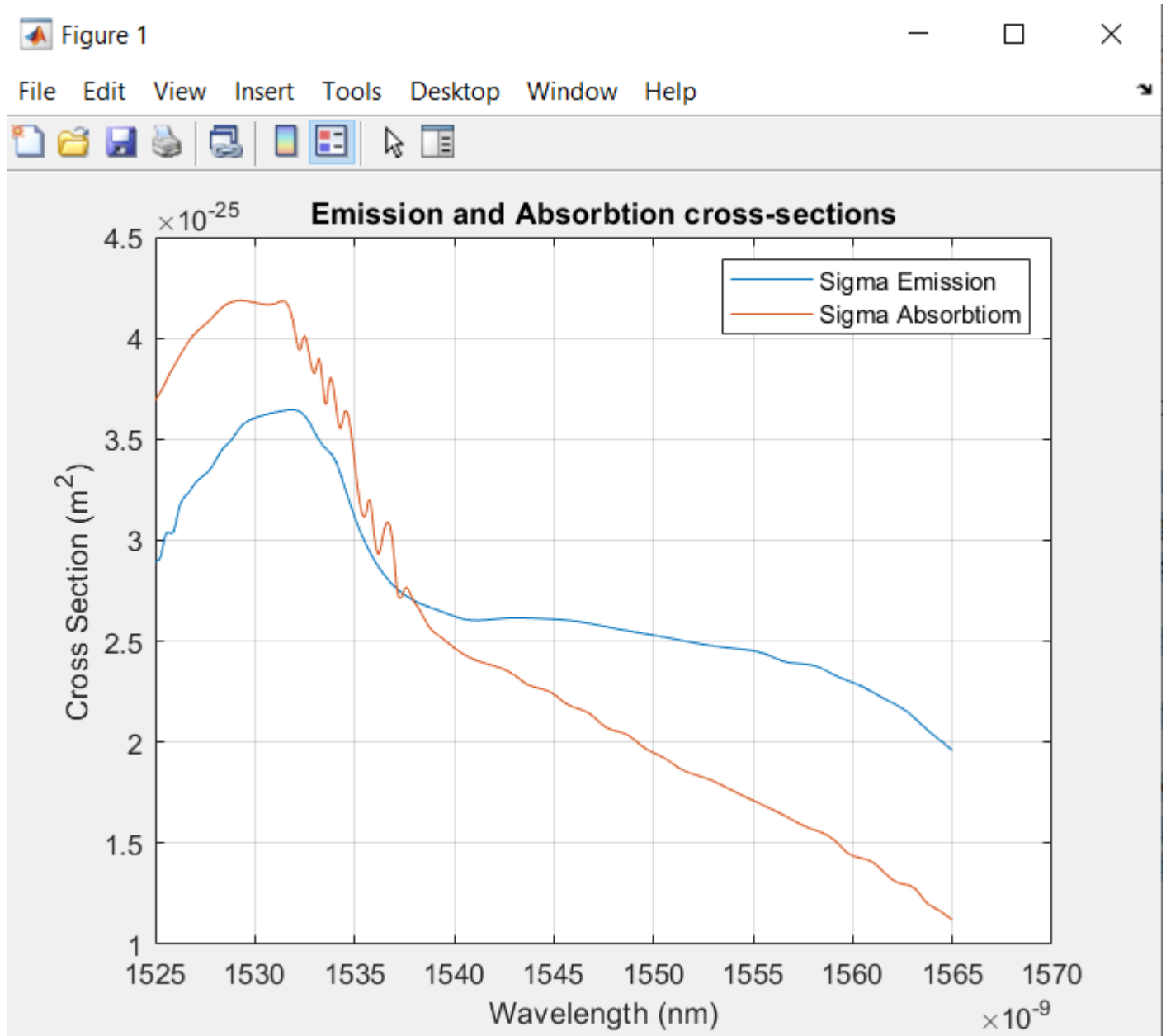
Youssef Ayman Ali(19P2643)

Course name:Optical

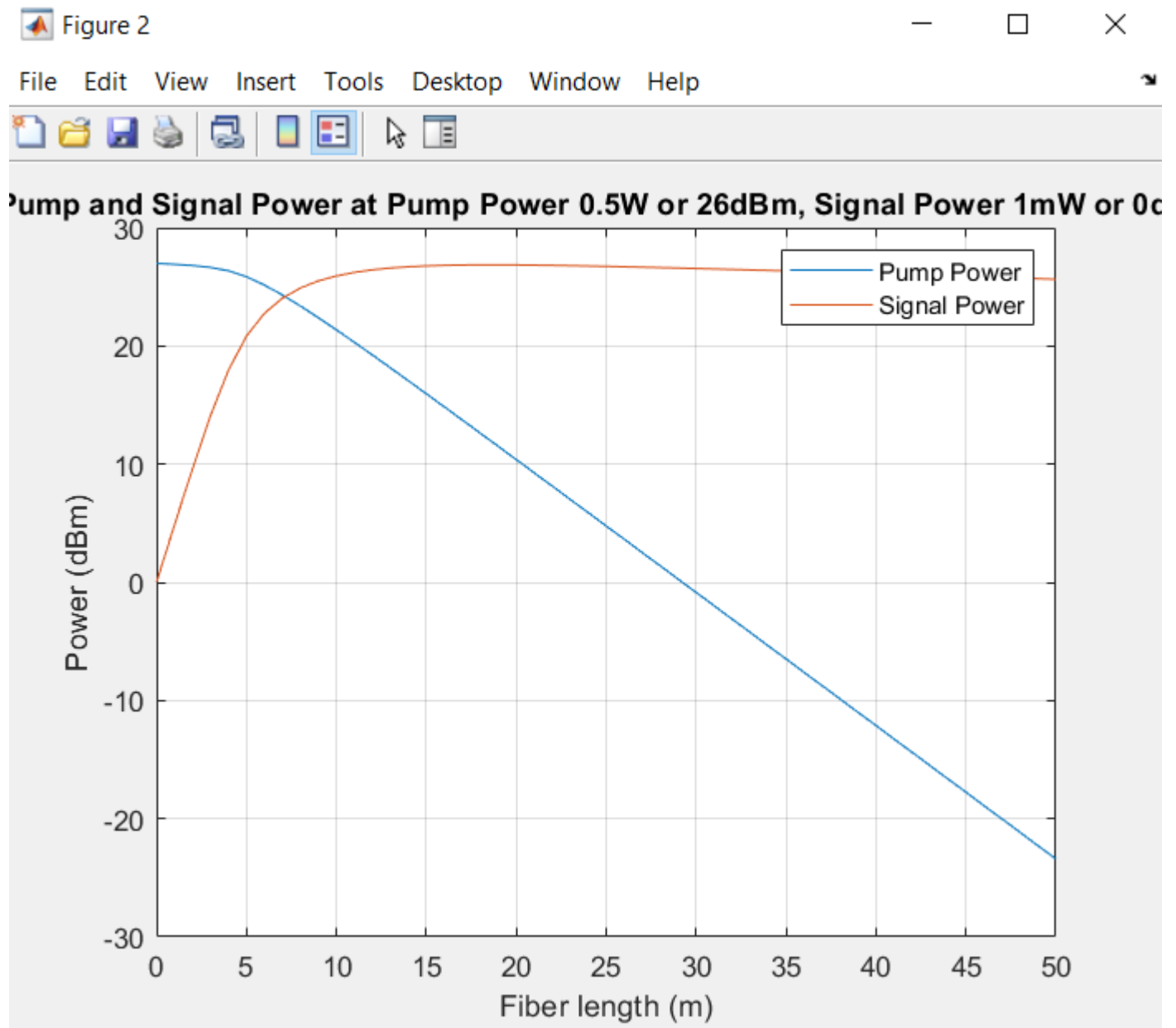
Communications

Couse code:ECE334

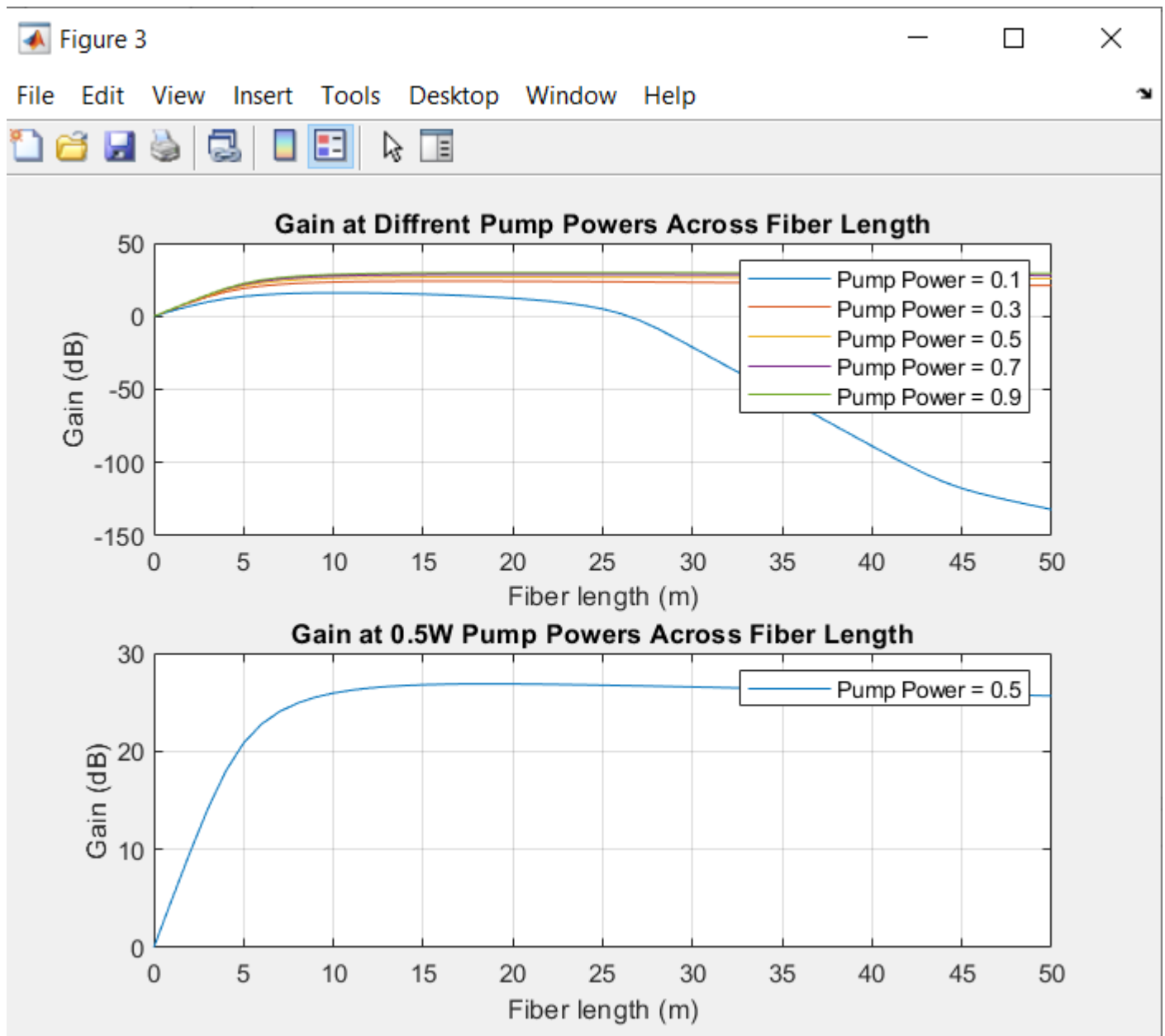
a) The absorption and emission cross section

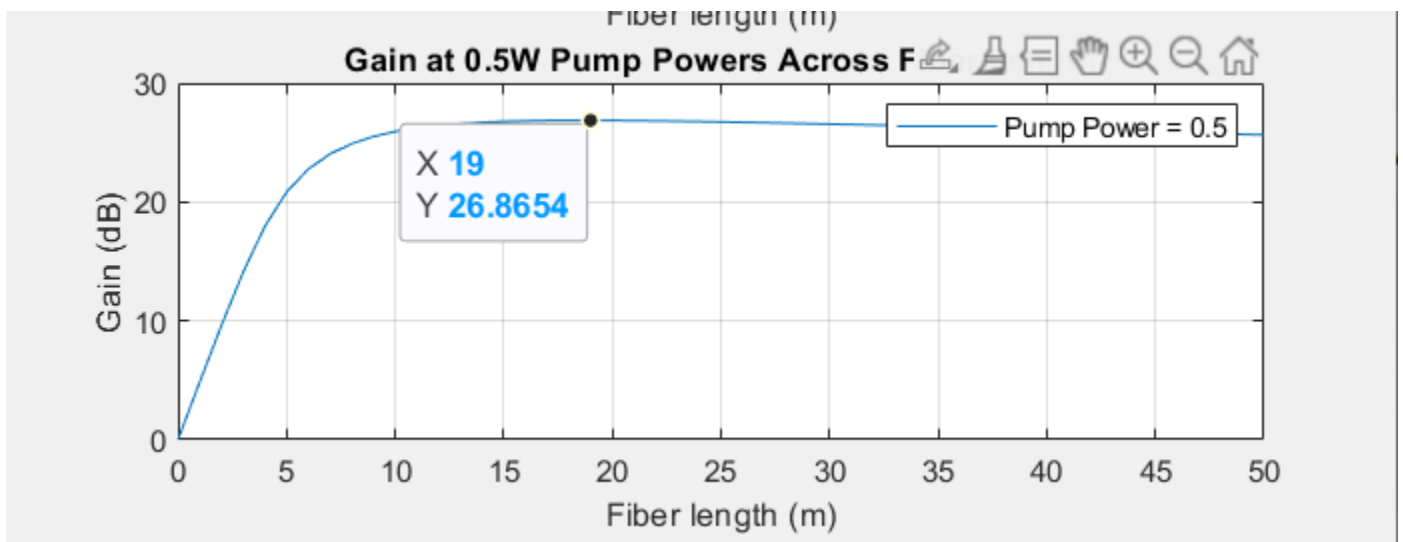


b) *P_p and P_{sout} vs position in the fiber (z) at certain wavelength: 1550nm.*



c) *Gain vs fiber length* at different pump powers:
calculate the optimum length at 0.5W pump power.





Optimum length at 19 m because it provides maximum gain

Confinement factor

$$\Gamma P_p \approx A N h \nu_p L_p / \tau_{sp}$$

gamma=0.4

Pp=0.5W

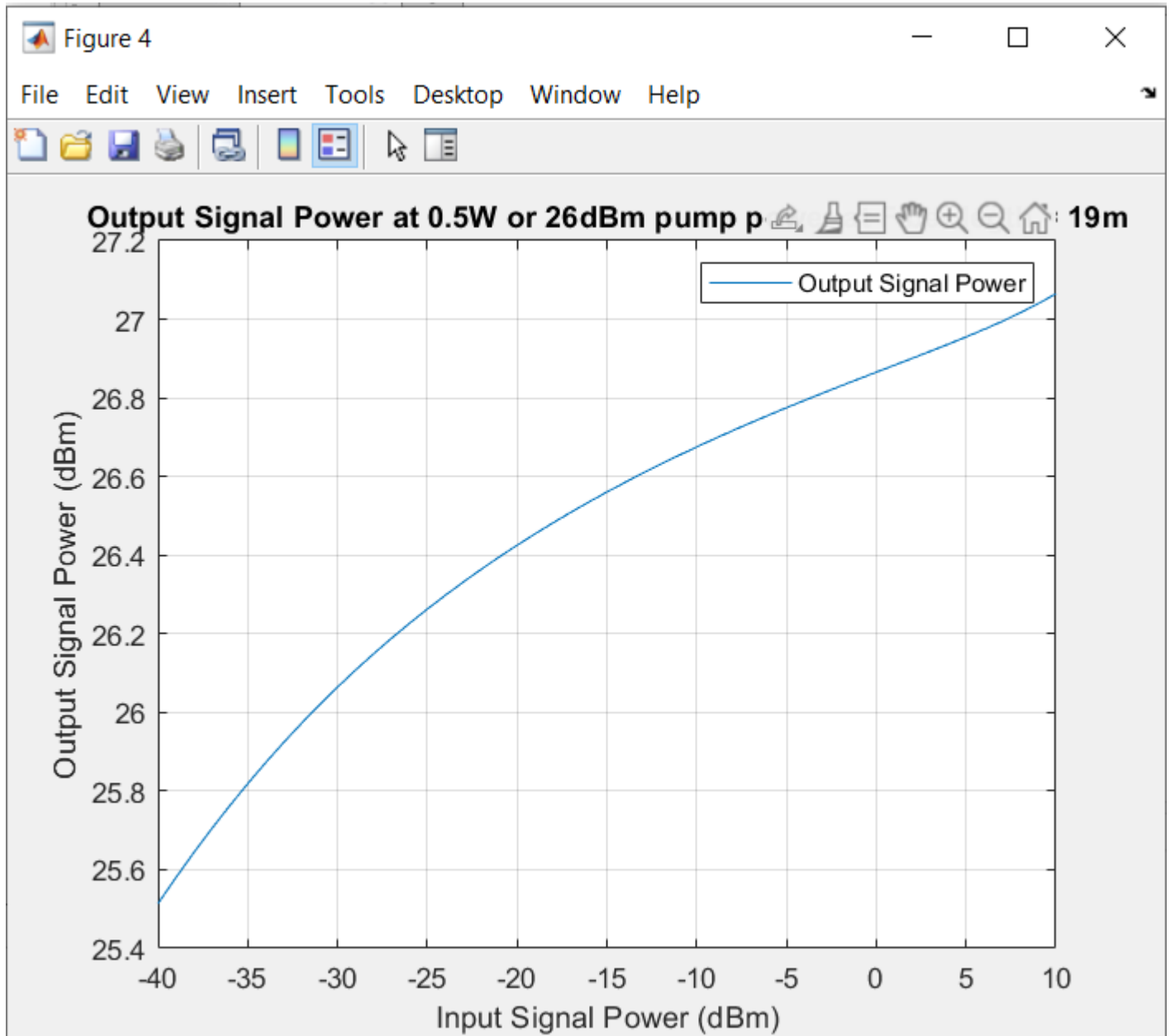
A=7.85*10⁻¹¹

vp=2.026*10¹⁴

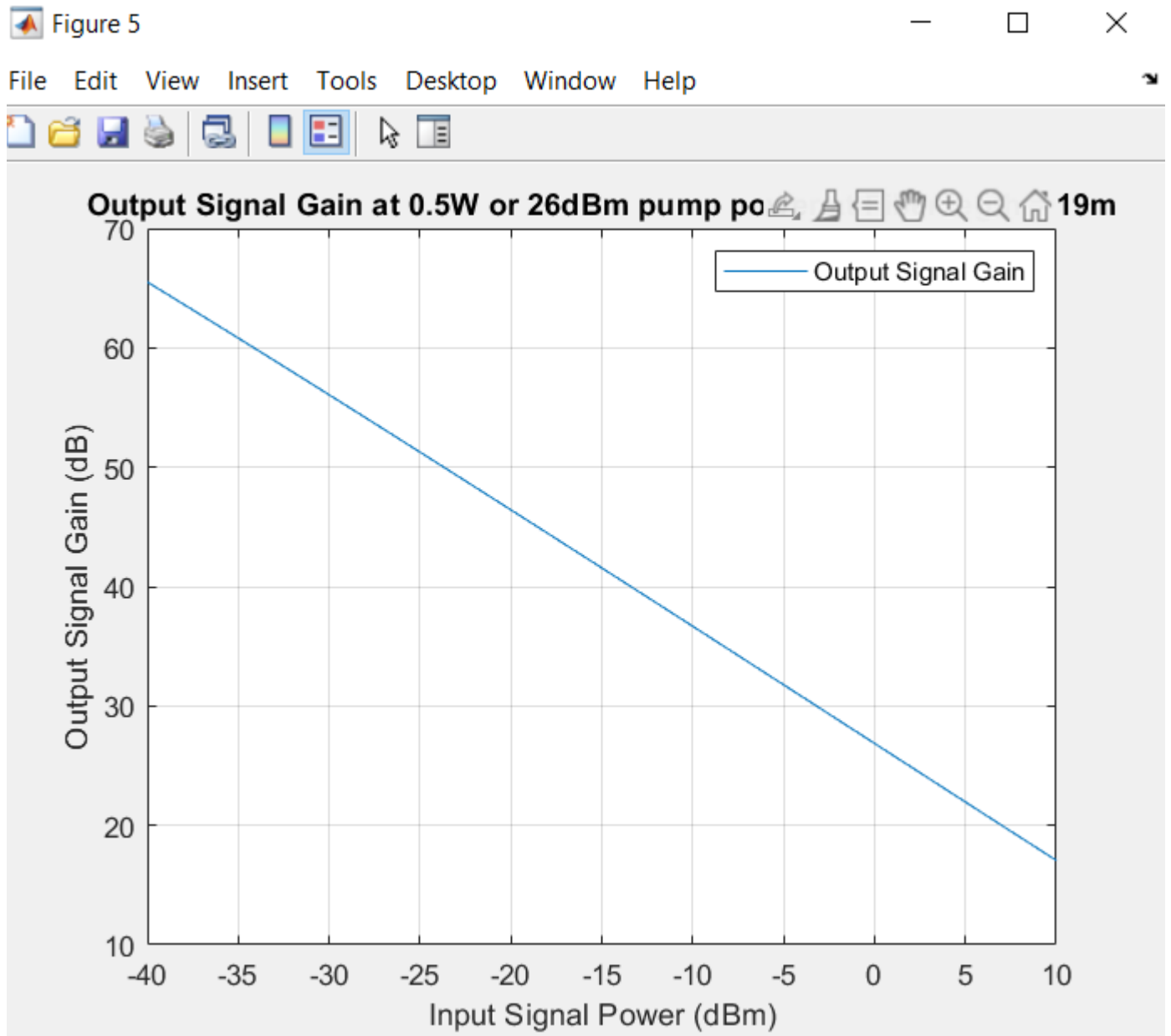
tsp=10*10⁻³

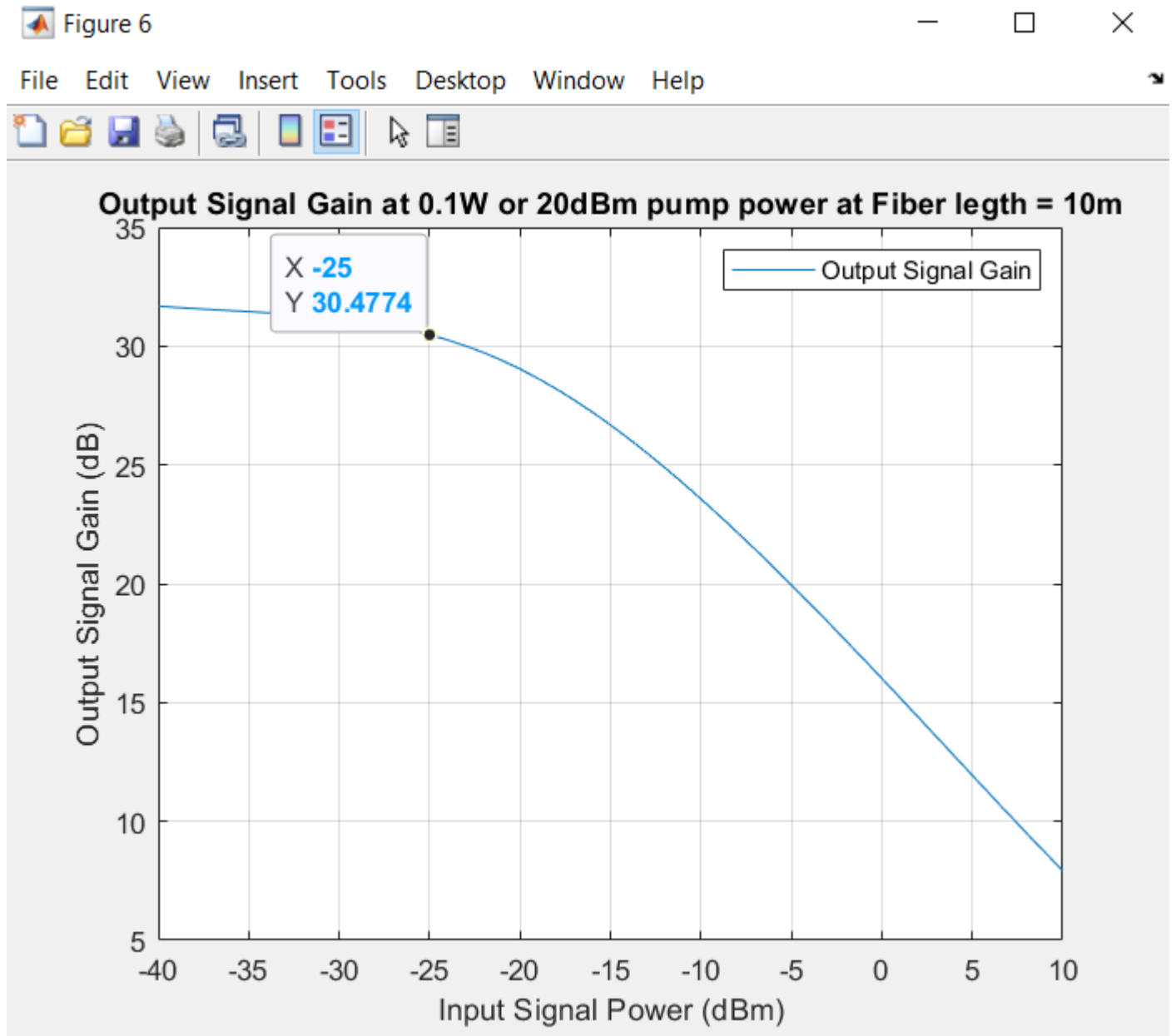
Calculating it theoretically using this equation yields 18.97m which is approximately 19m

d) P_{out} vs P_{in} on a log scale figure at the optimum fiber length



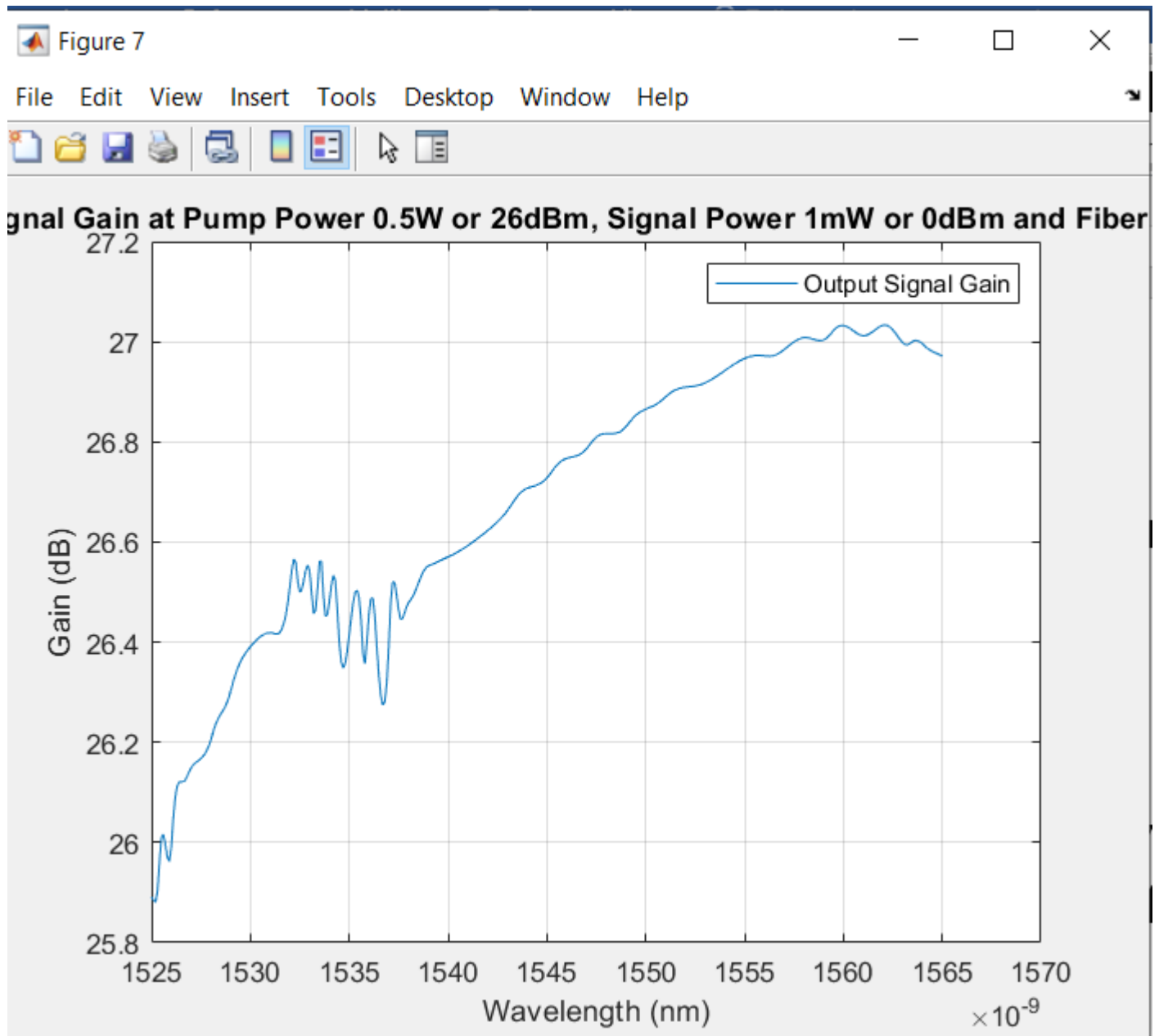
- e) *Gain vs P_{sin}* on a log scale figure at the optimum fiber length, compare the saturation input power to theoretical.





Saturation input power at 25 db

f) *Gain vs λ* at certain pump power and input power at all wavelengths.



g) P_{out} with ASE noise vs wavelength on a log scale figure with input power at 1550nm.

