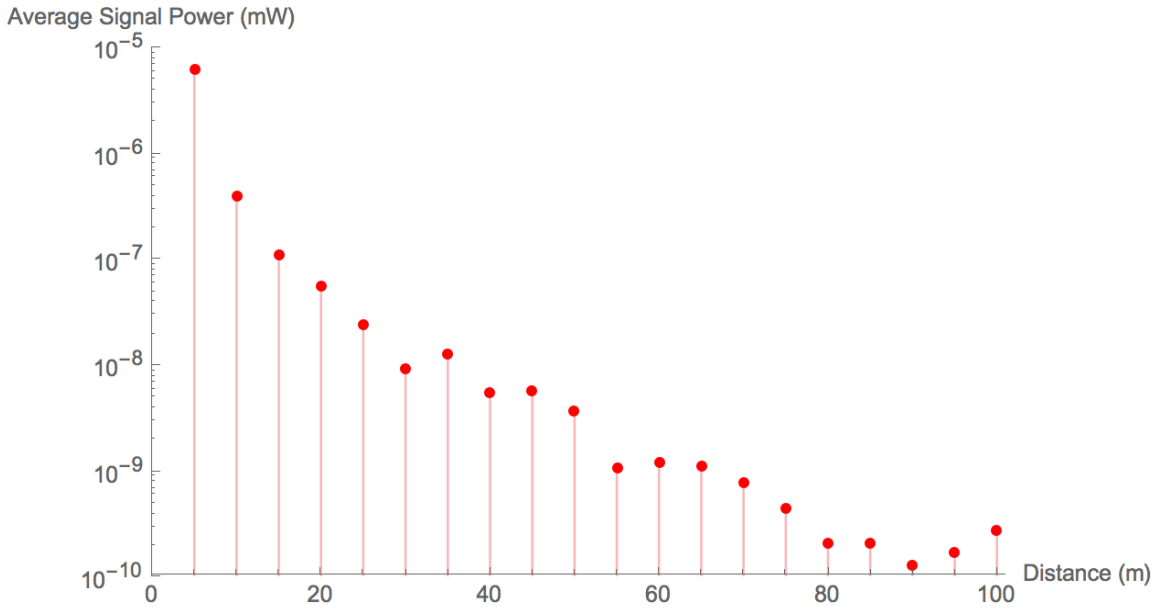
Inlämningsuppgift 2

The problem :
The problem is to find a function between average signal power (mW) with distance (m).

Figure:

Out[109]=



Name of Variables :

data : matrix with dimensions of 200x2 of single power and related distance
power : matrix with dimensions of 20x2 of ordered data
meanvalues : vector with 20 ordered average power values
function : table for distances and mean values
distribution : nearest fitting data for mean values

Solution [1]:

```
power = Table[{n, Take[data, {n, 180 + n, 20}, {2}]}, {n, 1, 20}];
distance = Table[n, {n, 5, 100, 5}];
meanvalues = Table[Mean[power[[n, 2]]], {n, 1, 20}];
meanvalues = ArrayReshape[meanvalues, {20}]
function = Table[{distance[[n]], meanvalues[[n]]}, {n, 1, 20}];
ListLogPlot[function, Filling -> Axis,
 PlotRange -> {{0, 101}, {10^-10, 10^-5}} , PlotStyle -> Red,
 PlotStyle -> PointSize[Large],
 AxesLabel -> {"Distance (m)", "Average Signal Power (mW)"}]
distribution = FindDistribution[meanvalues]


LogPlot[Table[
   PDF[ParetoDistribution[11, 27.238176377679427`, 4.167922332663147`,
      1.3305001115685648`*^-10], x], 4] // Evaluate, {x, 0, 100},
 PlotStyle -> Blue, AxesLabel -> "Pareto Distribution Plot"]
```

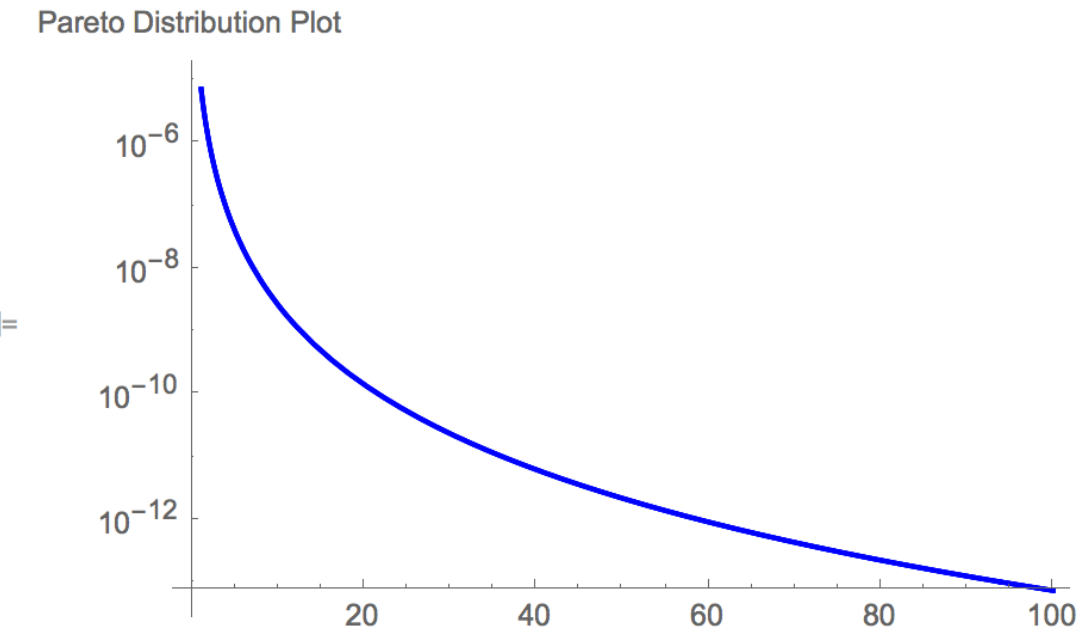
Out—> {6.35372*10^-6, 4.0763*10^-7, 1.10993*10^-7, 5.61165*10^-8,
2.43562*10^-8, 9.28937*10^-9, 1.28464*10^-8, 5.58308*10^-9,
5.74365*10^-9, 3.69663*10^-9, 1.09628*10^-9, 1.21276*10^-9,
1.12077*10^-9, 7.7993*10^-10, 4.52623*10^-10, 2.12614*10^-10,
2.09058*10^-10, 1.3306*10^-10, 1.72124*10^-10, 2.82954*10^-10}

Out —> ParetoDistribution[0.0129831, 27.2382, 4.16792, 1.3305*10^-10]

Discussion:

1) From the result and plotting, it seems that average signal power decreases when distance increases.
2) Since the number of data (signal power) is little, the suggested fitting distribution was Pareto Distribution. In fact, for fading signals the distribution should be Rayleigh distribution [2].

Out[128]=



References:

[1] Mathematica documentation 11
[2] https://en.wikipedia.org/wiki/Fading