

Introduction to Wireless and Mobile Network HW2

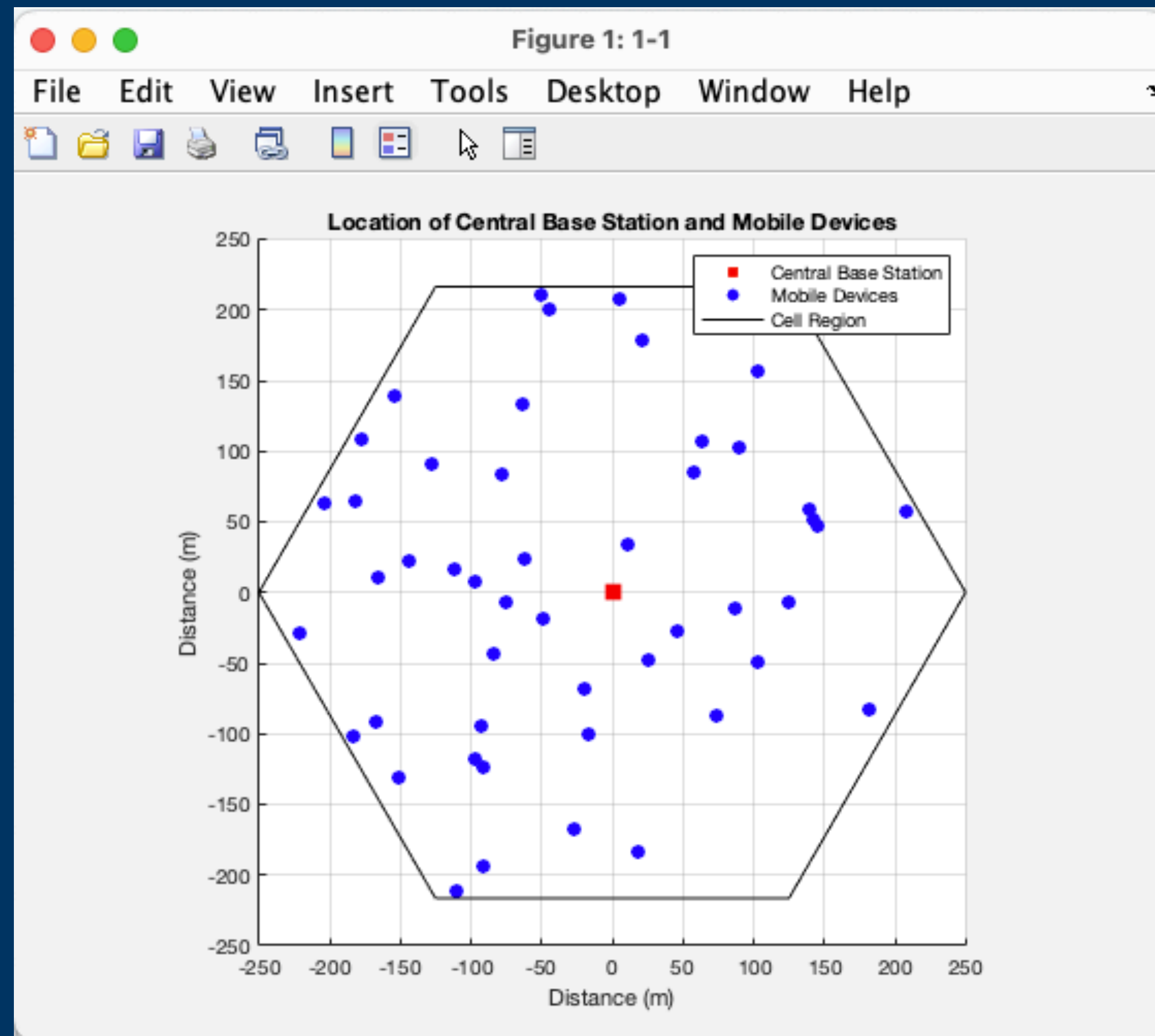
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2023/4/8

1.1 The figure of BS and 50 MS

Use some conditional expression to make the MS in the hexagon

```
while count < num_points
    x_rand_temp = rand * 2 * L - L;
    y_rand_temp = rand * 2 * L - L;
    if inpolygon(x_rand_temp, y_rand_temp, x, y)
        count = count + 1;
        x_rand(count) = x_rand_temp;
        y_rand(count) = y_rand_temp;
    end
end
```



1.2 The figure of received power to distance

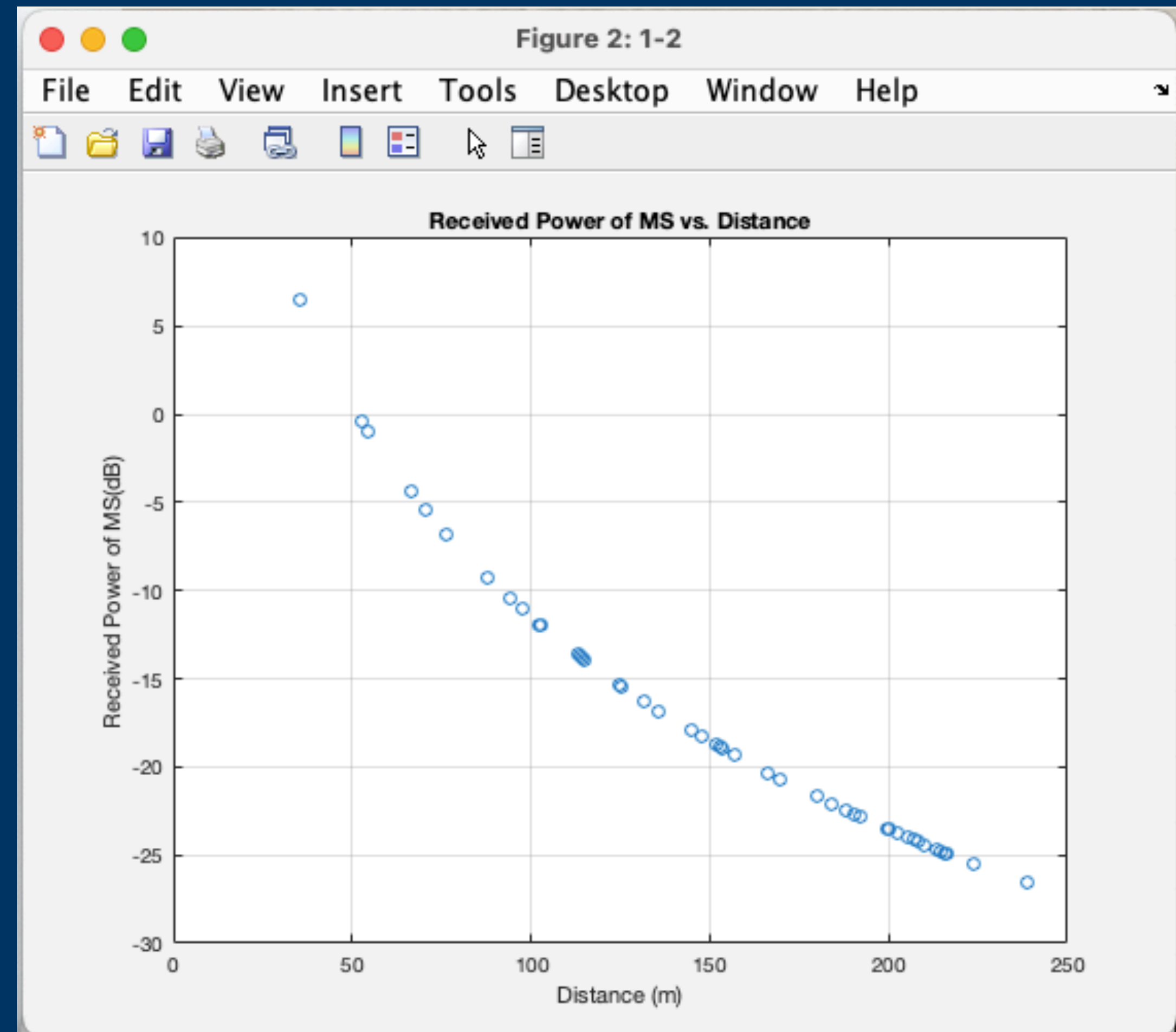
My equation to calculate the power:

```
% calculate distance between mobile devices and central BS
distance = sqrt((x_rand.^2) + (y_rand.^2));

% calculate path loss and trun into dB
gd = 10*log10(((h_bs*h_m)^2) ./ (distance.^4));

% calculate received power at mobile devices
prx = ptx + g_bs + g_m + gd;
```

Calculate the distance.
Calculate the pass loss.
Calculate the power.
All in dB scale.

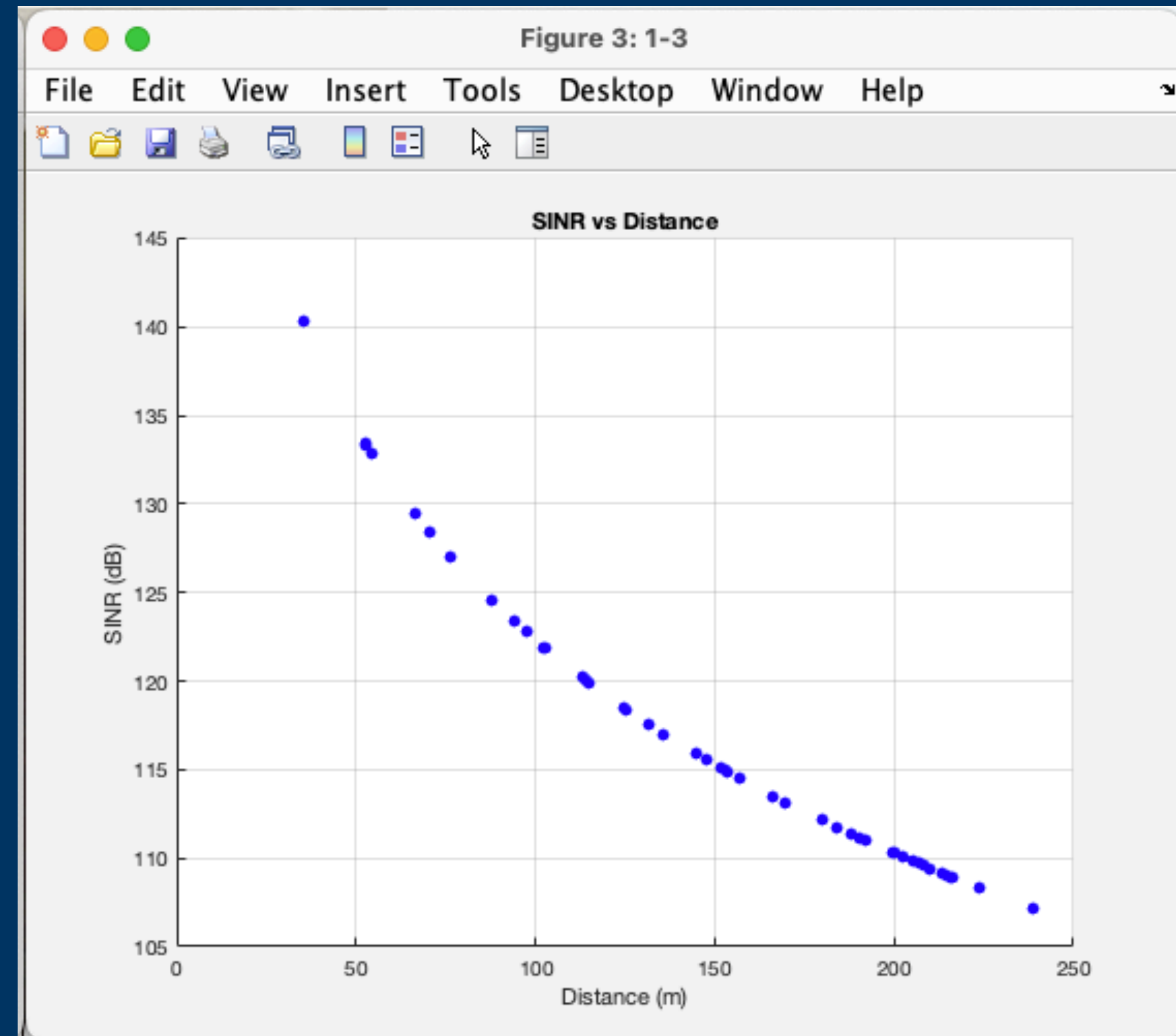


1.3 The figure of SINR to distance

My equation to calculate the SINR:

```
I = 0;  
N = k * temp * bw;  
N_dB = 10*log10(N);  
SINR = prx - (I+N_dB);
```

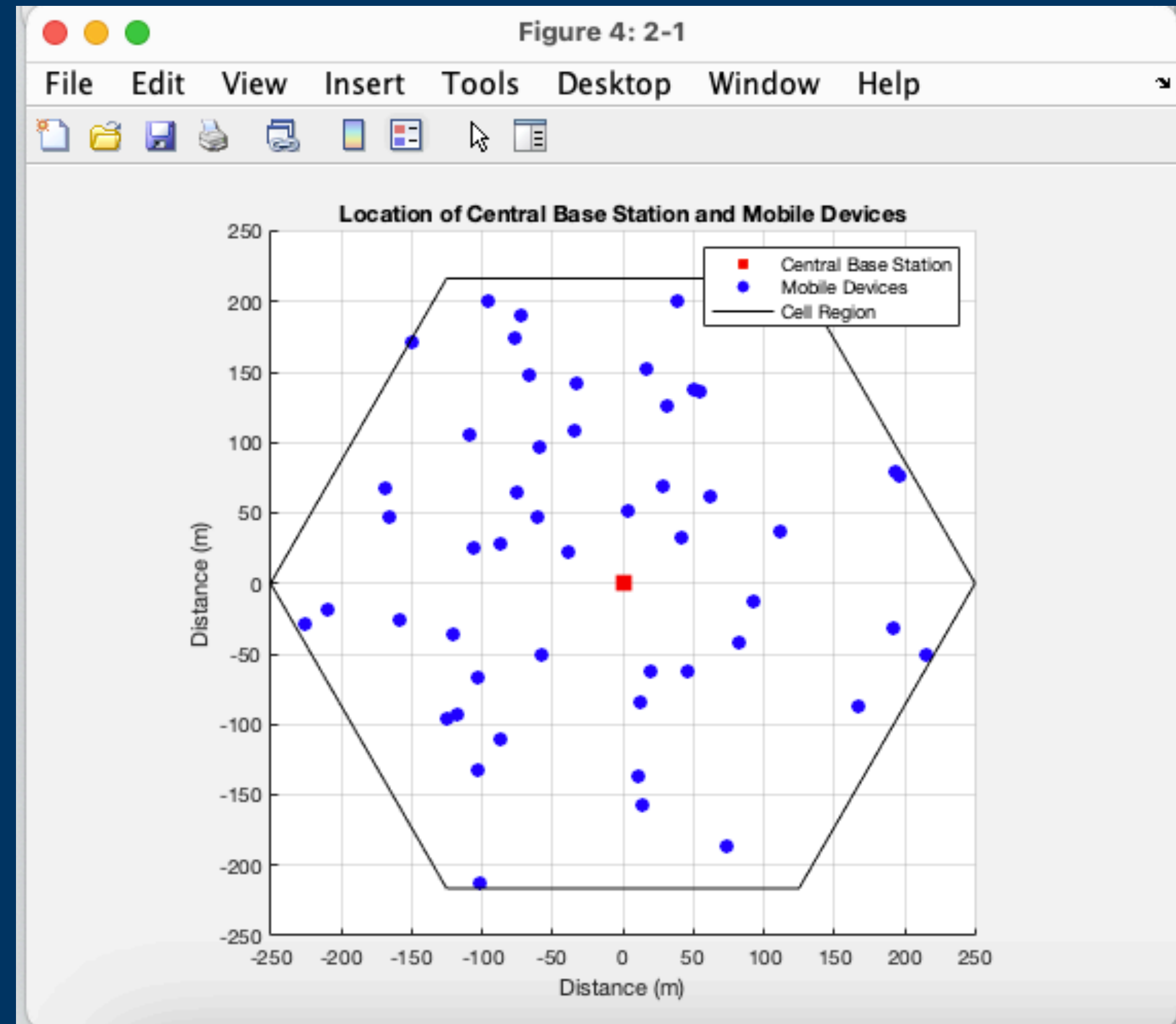
prx is the prx of 1.2
Interference = 0
All in dB scale.



2.1 The figure of BS and 50 MS

Use some conditional expression to make the MS in the hexagon

```
while count < num_points
    x_rand_temp = rand * 2 * L - L;
    y_rand_temp = rand * 2 * L - L;
    if inpolygon(x_rand_temp, y_rand_temp, x, y)
        count = count + 1;
        x_rand(count) = x_rand_temp;
        y_rand(count) = y_rand_temp;
    end
end
```

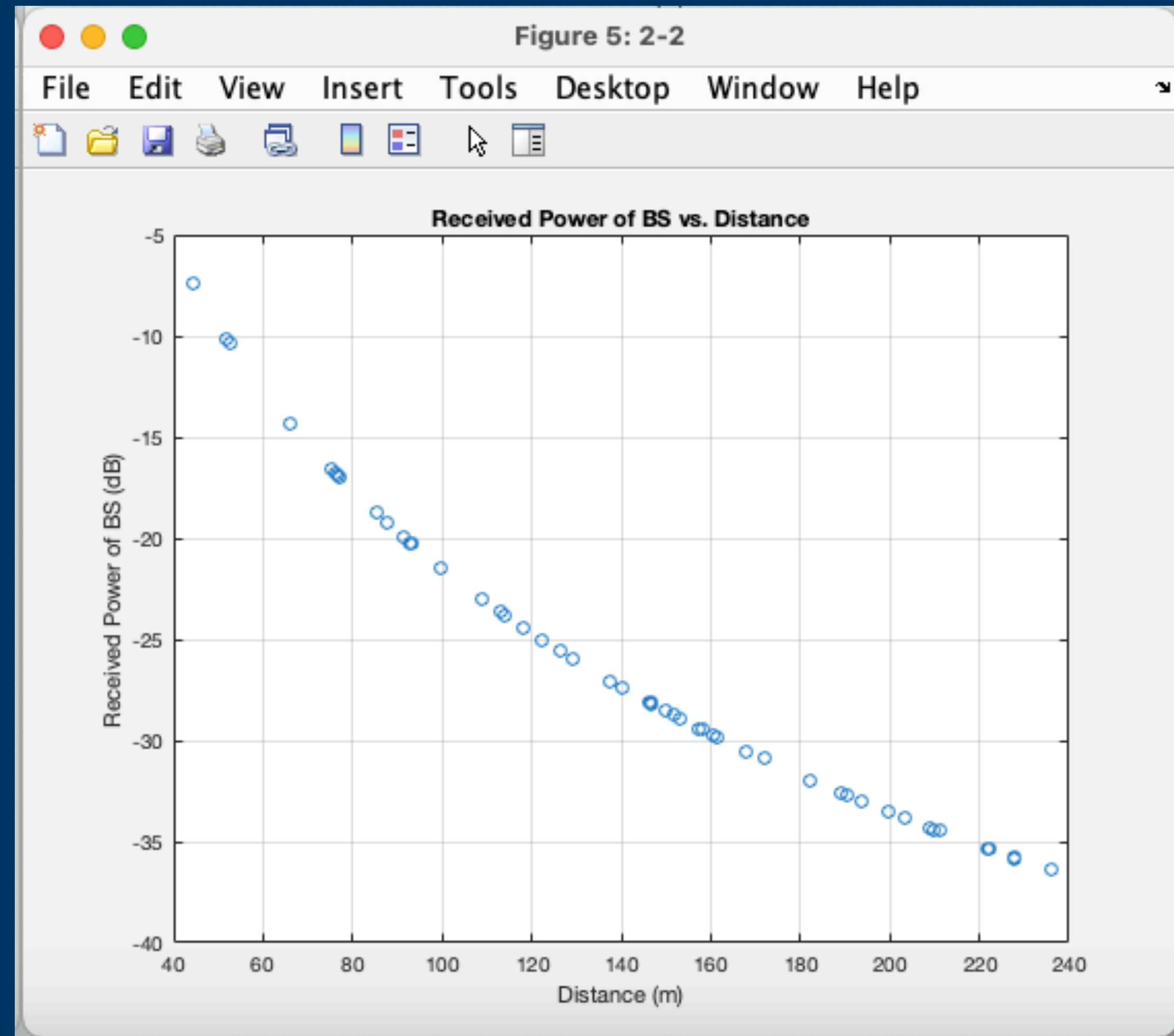


2.2 The figure of received power to distance

My equation to calculate the power:

```
distance = sqrt((x_rand.^2) + (y_rand.^2));  
gd = 10*log10(((h_bs*h_m)^2) ./ (distance.^4));  
prx_2 = pm + g_bs + g_m + gd;
```

Calculate the distance.
Calculate the pass loss.
Calculate the power.
All in dB scale.

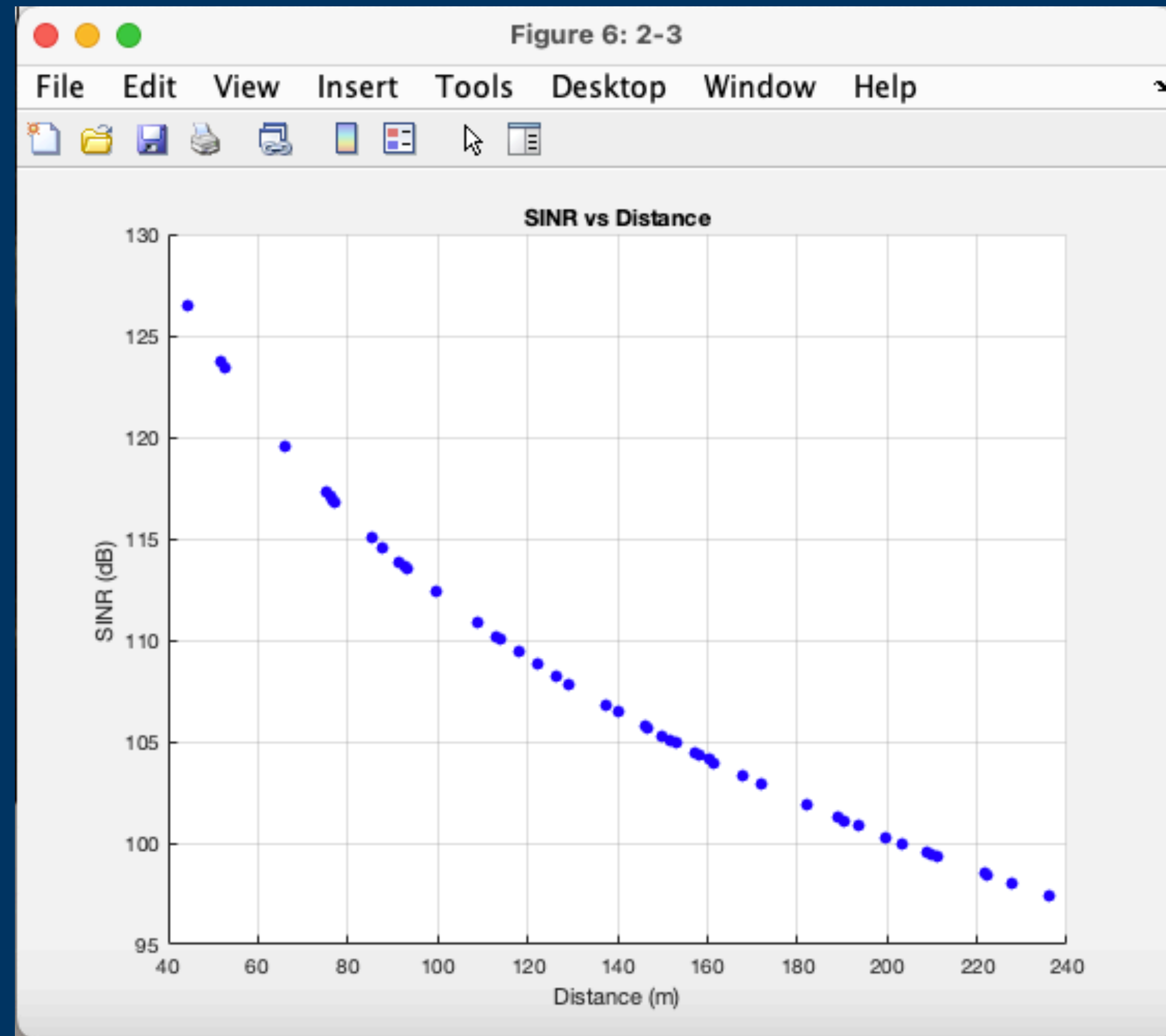


2.3 The figure of SINR to distance

My equation to calculate the SINR:

```
I = 0;  
N = k * temp * bw;  
N_dB = 10*log10(N);  
SINR_2 = prx_2 - (I + N_dB);
```

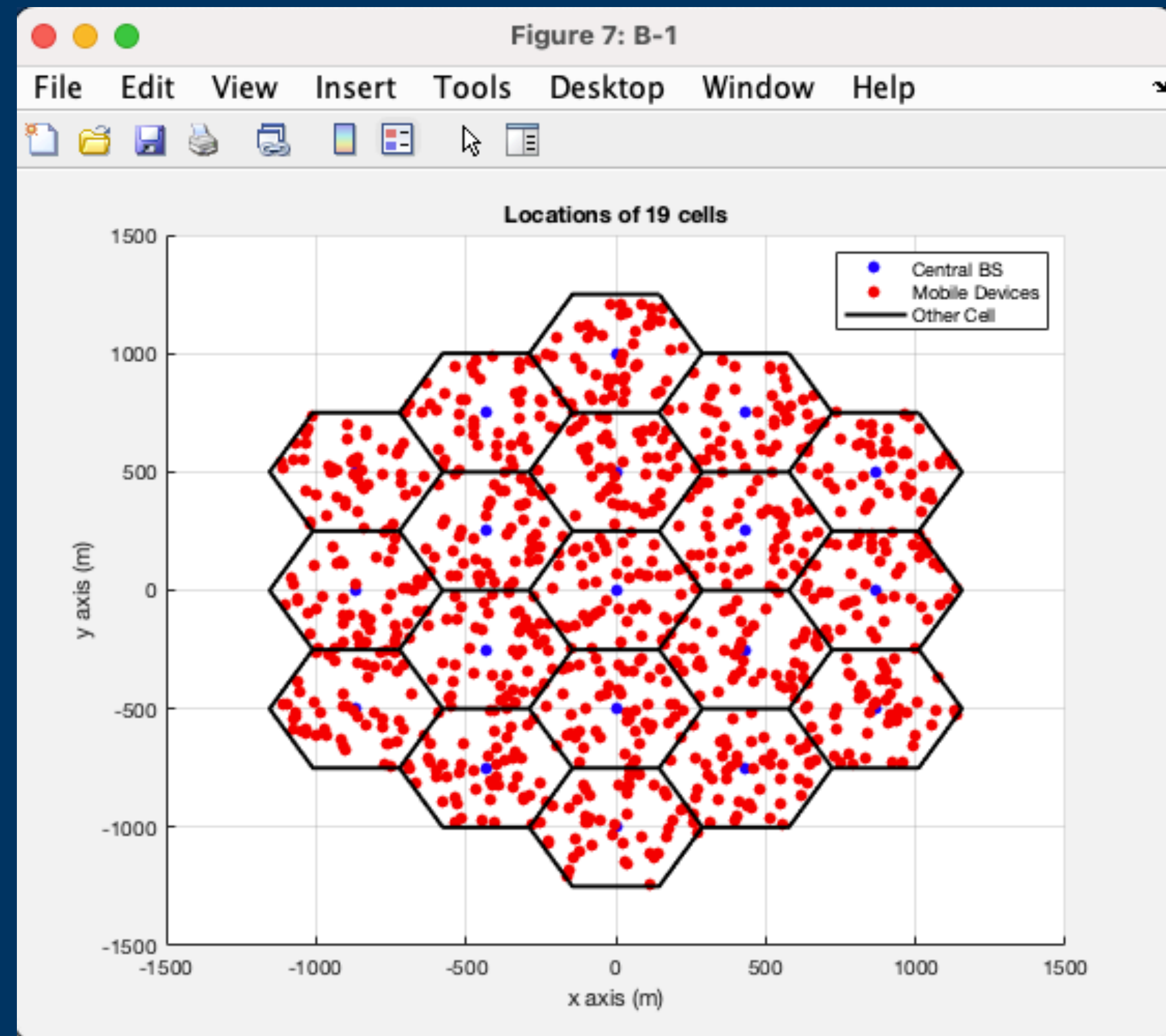
prx_2 is the prx_2 of 2.2
Interference = 0
All in dB scale.



B-1 The figure of all 19 cells

Use some conditional expression to make the MS in the hexagon

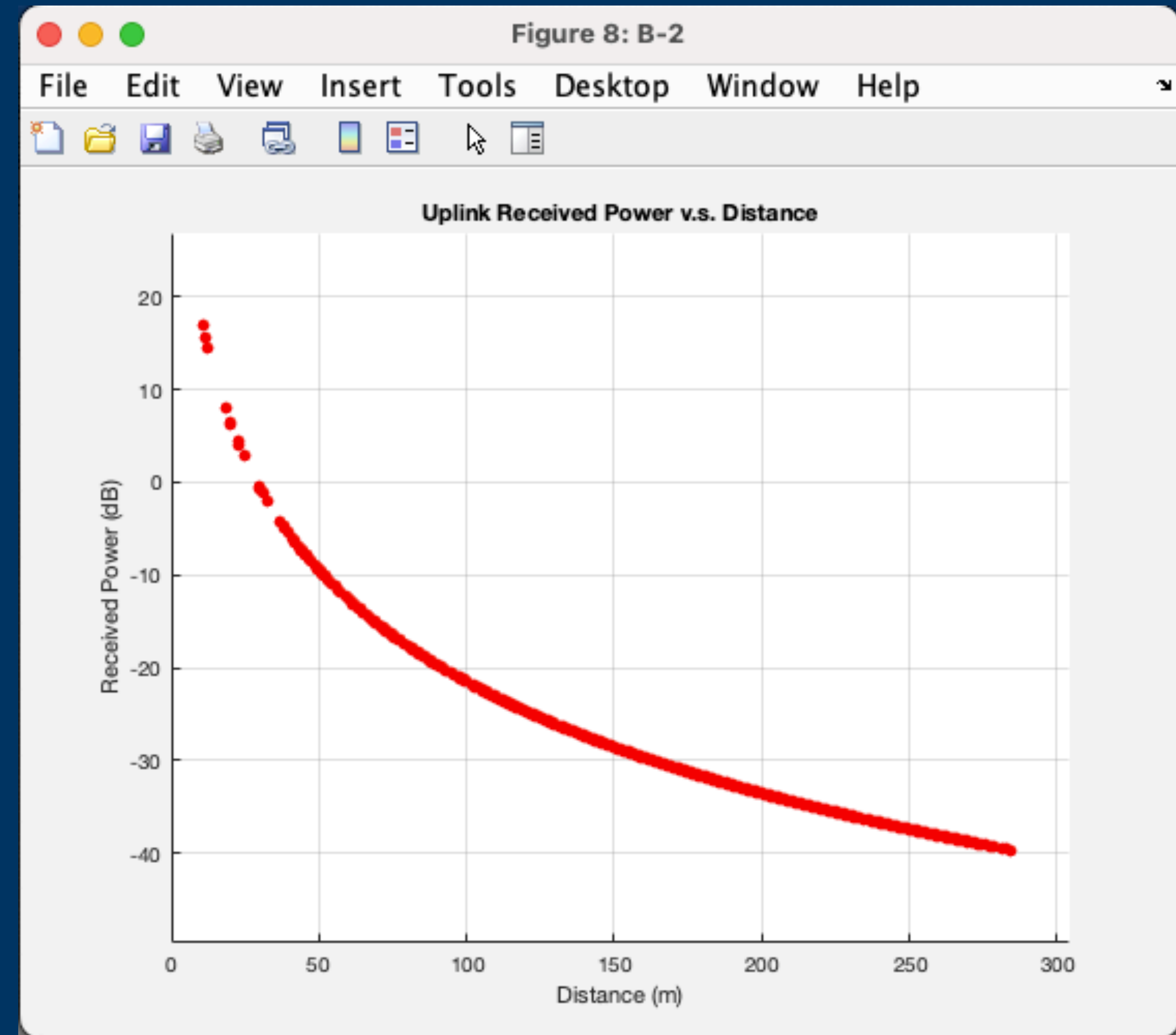
```
while count < num_points
    x_rand_temp = rand * 2 * L - L;
    y_rand_temp = rand * 2 * L - L;
    if inpolygon(x_rand_temp, y_rand_temp, x, y)
        count = count + 1;
        x_rand(count) = x_rand_temp;
        y_rand(count) = y_rand_temp;
    end
end
```



B-2 Uplink received power v.s. distances

My equation to calculate the power:

```
gd = 10*log10(((h_bs*h_ms)^2) ./ (distances.^4));  
pr_dB_2 = pm + g_bs + g_m + gd;
```



Reference

<https://chat.openai.com/chat>