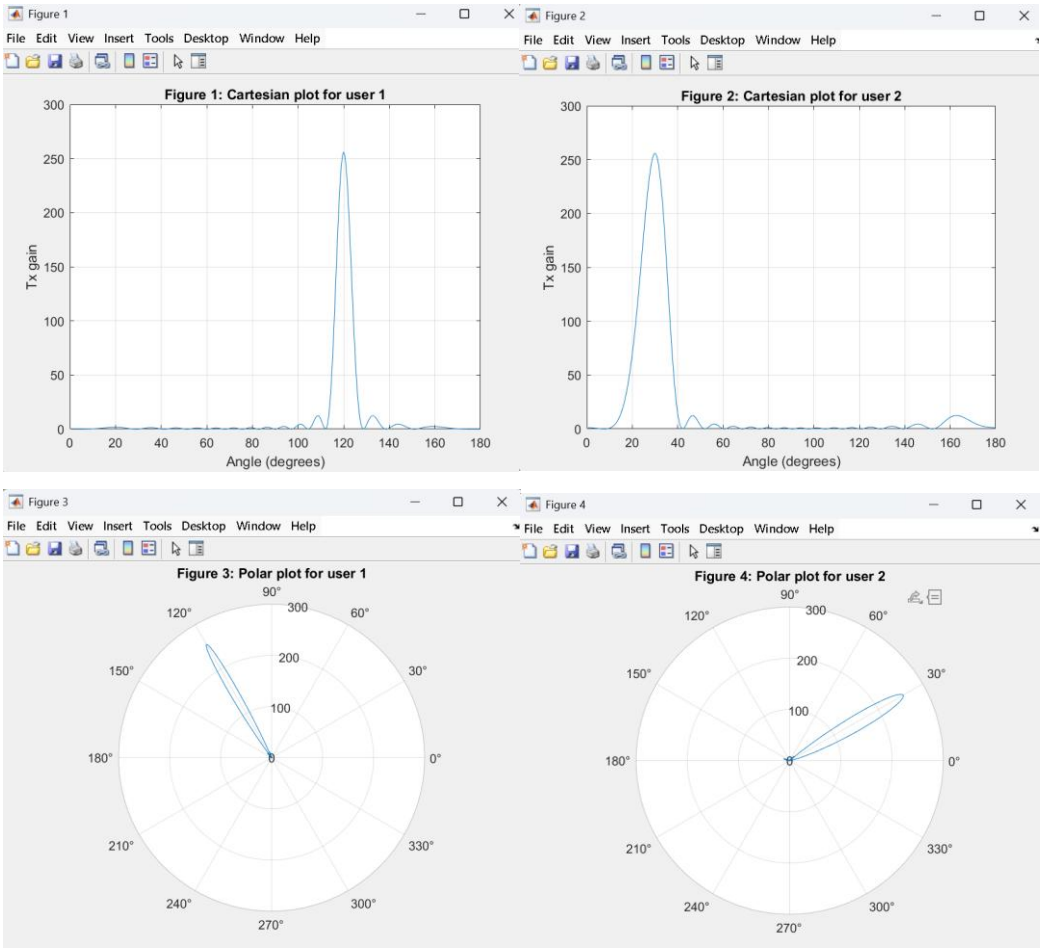
Task：

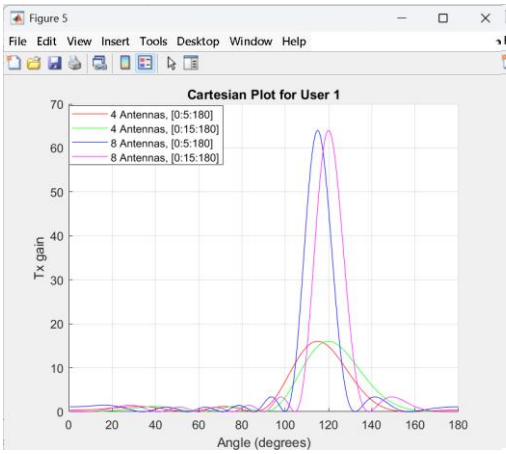
```
Task1: Calculate AoD
Rx1 Actual Angle: 115.595208 degree
Rx2 Actual Angle: 25.076622 degree

Task2: Calculate Rx power and SNR
Rx1 power: -48.307848 dBm
Rx1 SNR: 39.692152 dB

Task3: Calculate SINR for two concurrent beams
Rx1 interference power: -70.180212 dBm
Rx1 SINR: 18.790903 dB
```

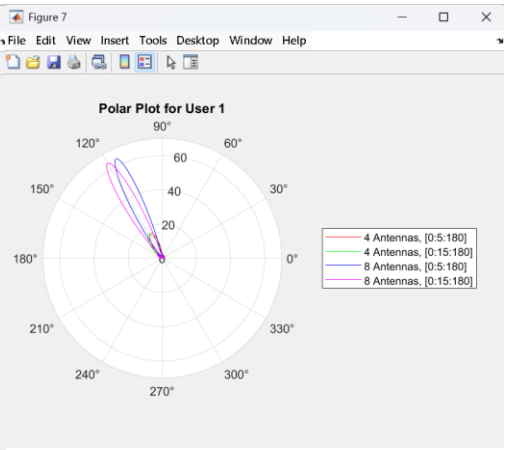


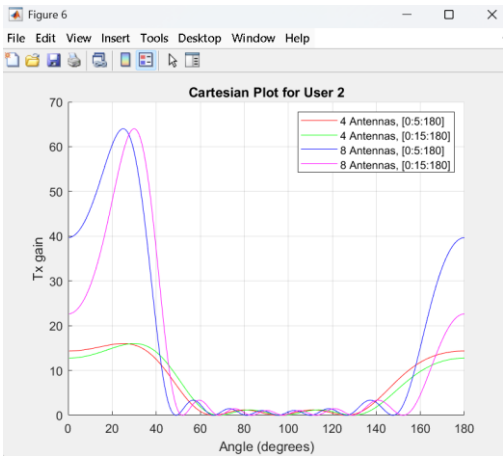
Comparison：

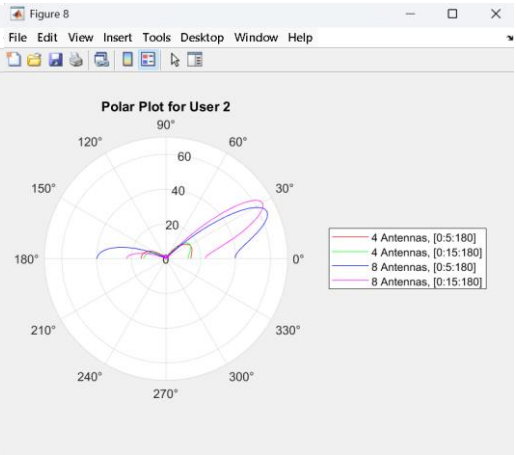
```
--- Tx Antennas: 4 ---

--- Codebook size: 5 ---
Calculate Rx1 power and SNR
Rx1 power: -55.391847 dBm
Rx1 SNR: 32.608153 dB

Calculate SINR of two concurrent beams
Rx1 interference power: -70.525005 dBm
Rx1 SINR: 12.045869 dB

--- Codebook size: 15 ---
Calculate Rx1 power and SNR
Rx1 power: -55.648994 dBm
Rx1 SNR: 32.351006 dB

Calculate SINR of two concurrent beams
Rx1 interference power: -69.838262 dBm
Rx1 SINR: 11.113155 dB
```

```
--- Tx Antennas: 8 ---

--- Codebook size: 5 ---
Calculate Rx1 power and SNR
Rx1 power: -49.381932 dBm
Rx1 SNR: 38.618068 dB

Calculate SINR of two concurrent beams
Rx1 interference power: -70.203655 dBm
Rx1 SINR: 17.739880 dB

--- Codebook size: 15 ---
Calculate Rx1 power and SNR
Rx1 power: -50.484011 dBm
Rx1 SNR: 37.515989 dB

Calculate SINR of two concurrent beams
Rx1 interference power: -74.622314 dBm
Rx1 SINR: 20.932917 dB
```









Answers from 20 random runs for tasks 1 to 3 (code book:[0:5:180])

(16 antennas)

```
Average Rx1 power: -39.973351 dBm
Average Rx1 SNR: 48.026649 dB
Average Rx1 interference power: -70.238652 dBm
Average Rx1 SINR: 26.937407 dB
```

(8 antennas)

```
Average Rx1 power: -44.849329 dBm
Average Rx1 SNR: 43.150671 dB
Average Rx1 interference power: -68.259815 dBm
Average Rx1 SINR: 19.769791 dB
```

(4 antennas)

```
Average Rx1 power: -50.610914 dBm
Average Rx1 SNR: 37.389086 dB
Average Rx1 interference power: -70.102652 dBm
Average Rx1 SINR: 15.141264 dB
```

Observation：

天線數量越多，gain 的範圍就會越集中，高峰值也比較大，所以 Rx power 較大 → SNR 會顯著提升。

Code book 越精準 (0:5:180 vs 0:15:180)，beam 就可以瞄的越準，SNR 也會稍微提升，但畢竟 gain table 沒有變，所以不像提高天線數量那麼明顯。