5.5.25) Eigenvalue and eigenbeam plots follow for unequal signal power case

(i) $S_2 = S_1 = 0$ dB

(ii) $S_2 = 10$ dB, $S_1 = 0$ dB

(iii) $S_2 = 20$ dB, $S_1 = 0$ dB

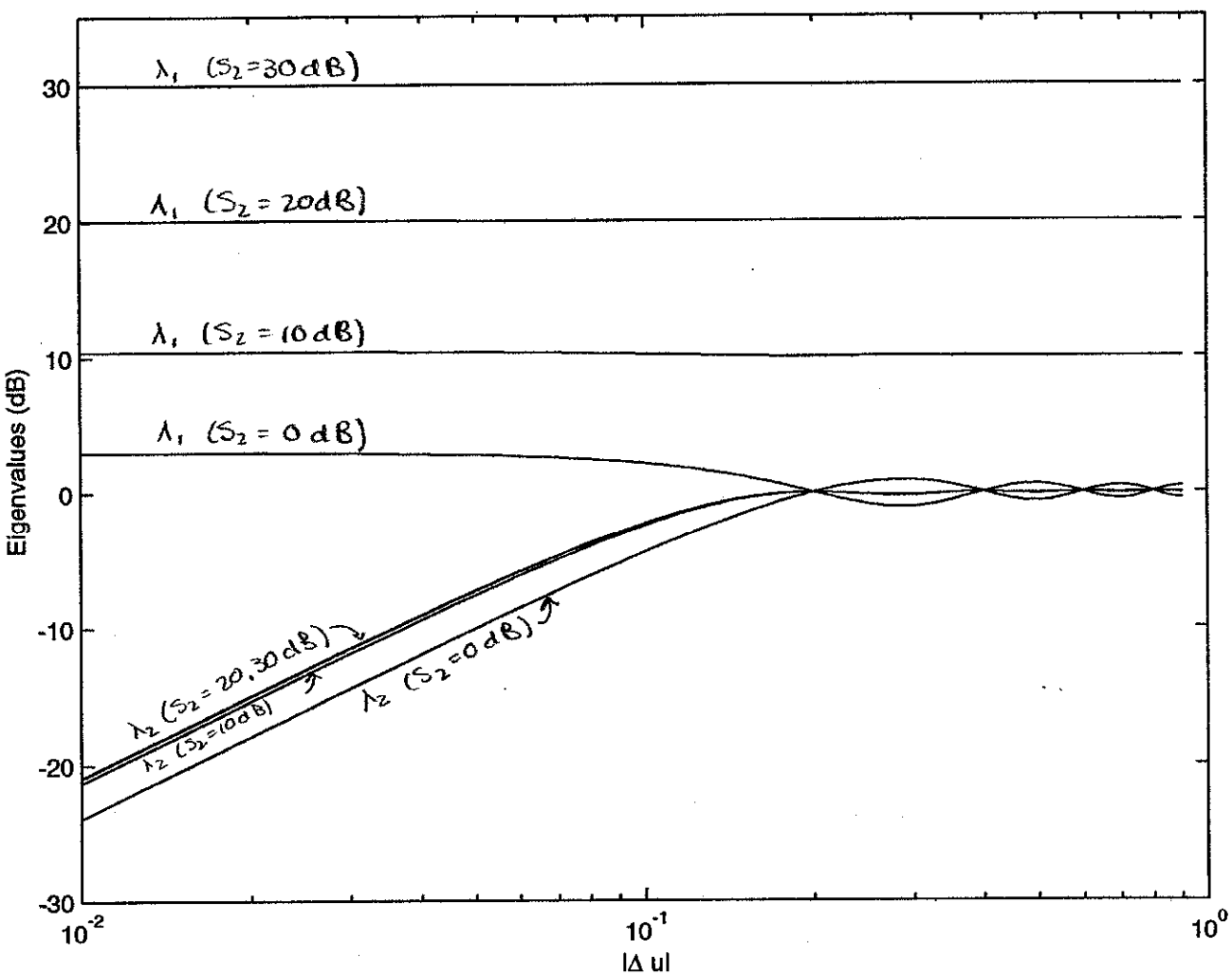
(iv) $S_2 = 30$ dB, $S_1 = 0$ dB

- eigenvalues agree exactly with analytical expressions
- eigenvectors agree to within complex rotation factor

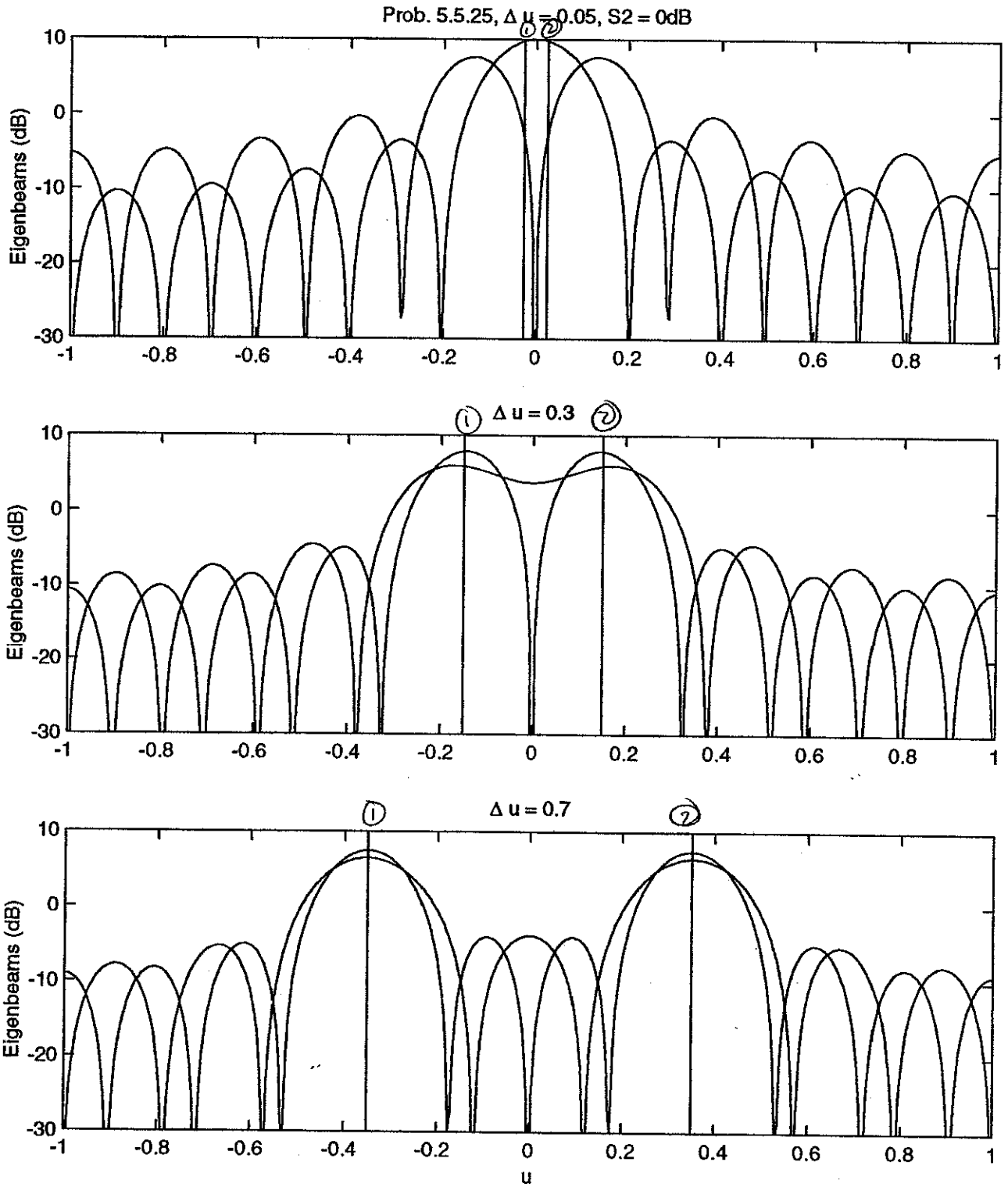
(i) eigenbeams are sum and difference beams

(ii)-(iv) eigenbeams are no longer sum and difference beams. The first eigenbeam looks like a conventional beampattern steered to source 2 (the stronger source). The second beam looks like a conventional beam steered to source 1 with a null at source 2. When $S_2 = 10$ dB, the null is less than 30 dB, but for $S_2 = 20$ dB and 30 dB, the null is deep. As the signals became very close, the second eigenbeam starts to point away from source 1, so that the null on source 2 can be maintained.

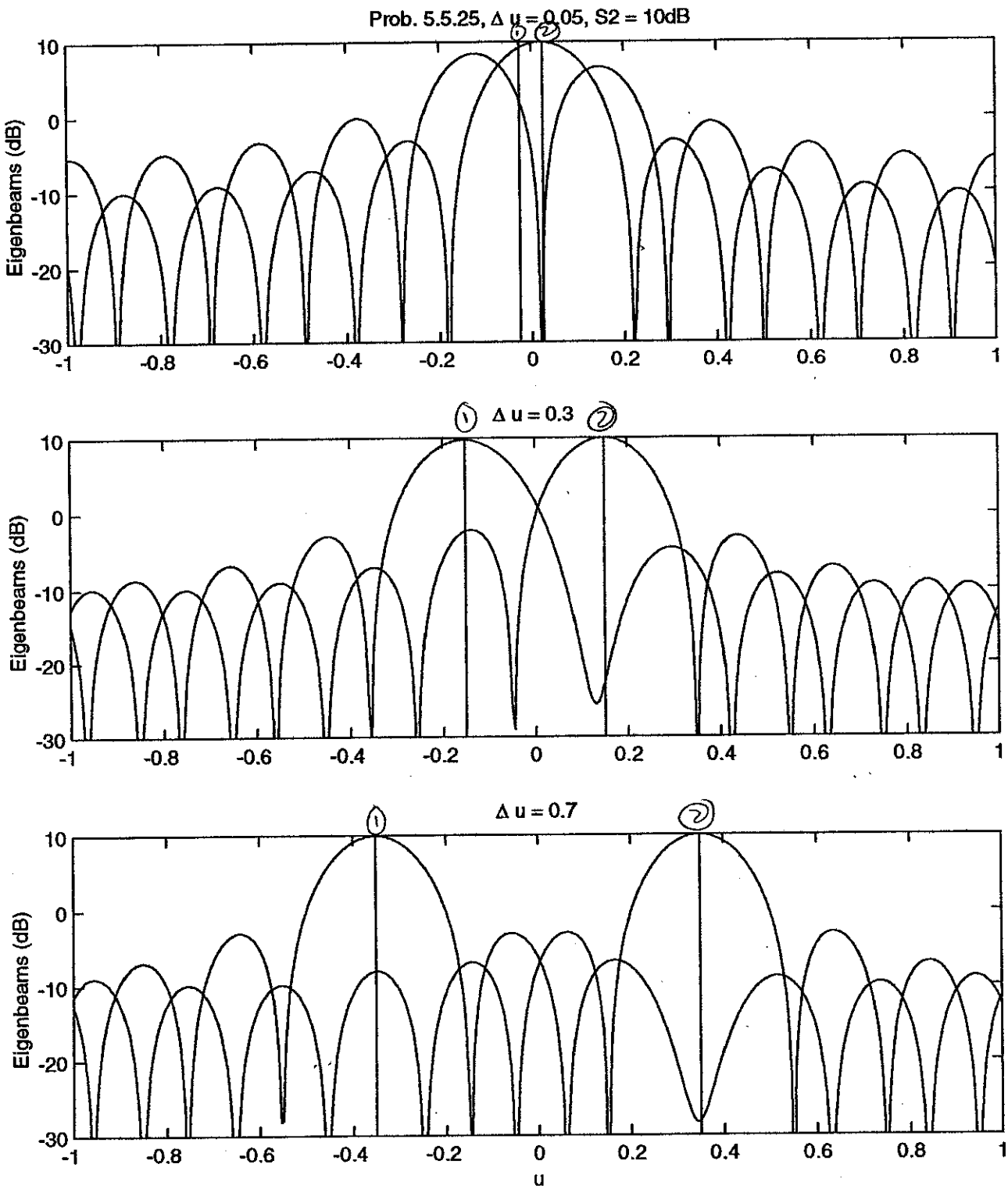
Prob. 5.5.25


λ1 (S2=30dB)
λ1 (S2 = 20dB)
λ1 (S2 = 10dB)
λ1 (S2 = 0 dB)
λ2 (S2 = 20, 30dB)
λ2 (S2=10dB)
λ2 (S2=0dB)
Eigenvalues (dB)
30
20
10
0
-10
-20
-30
10^-2
10^-1
10^0
|Δ ul|

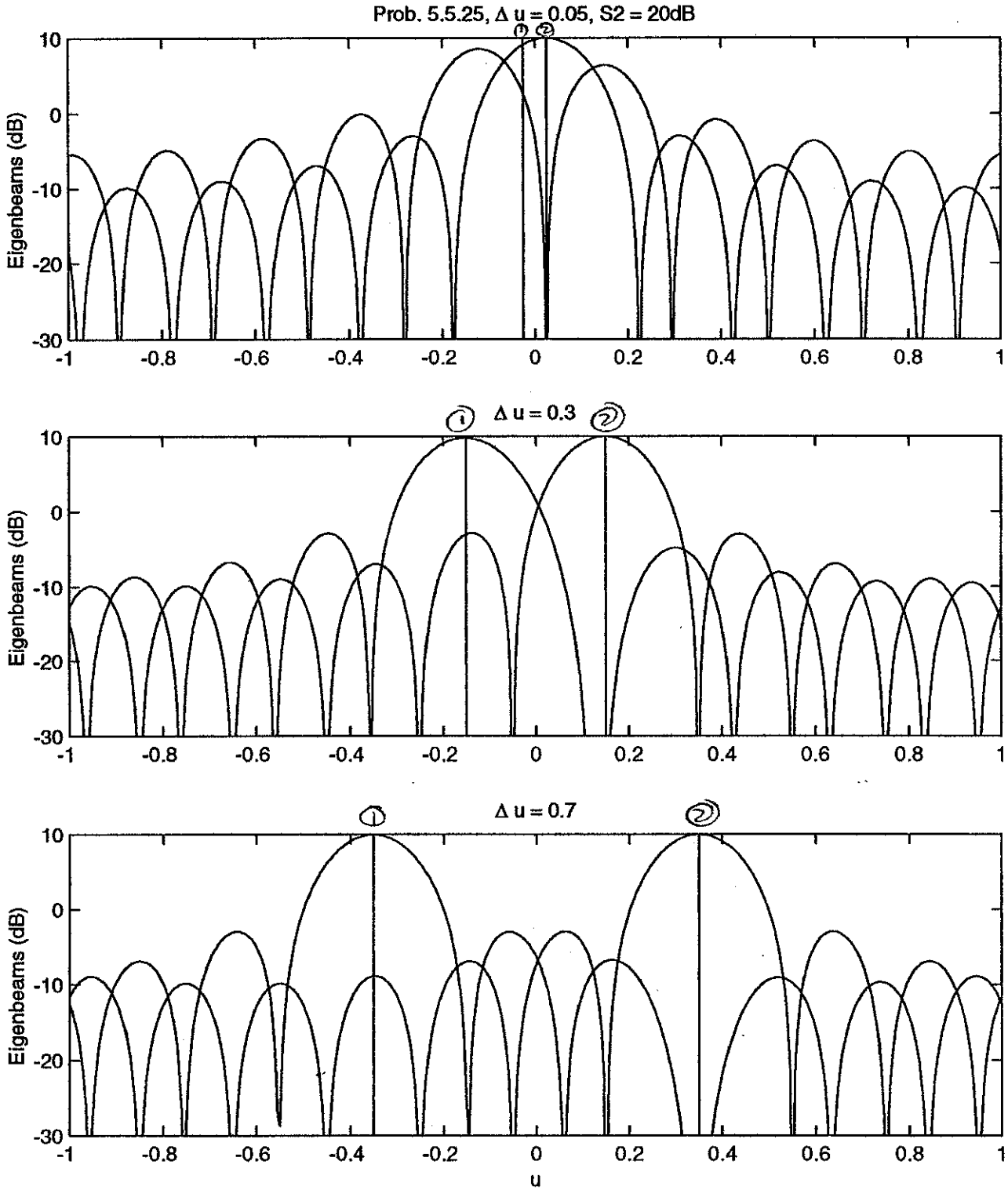
6.5.25 3/6


Prob. 5.5.25, Δ u = 0.05, S2 = 0dB
Eigenbeams (dB)
10
0
-10
-20
-30
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
Δ u = 0.3
Δ u = 0.7
u

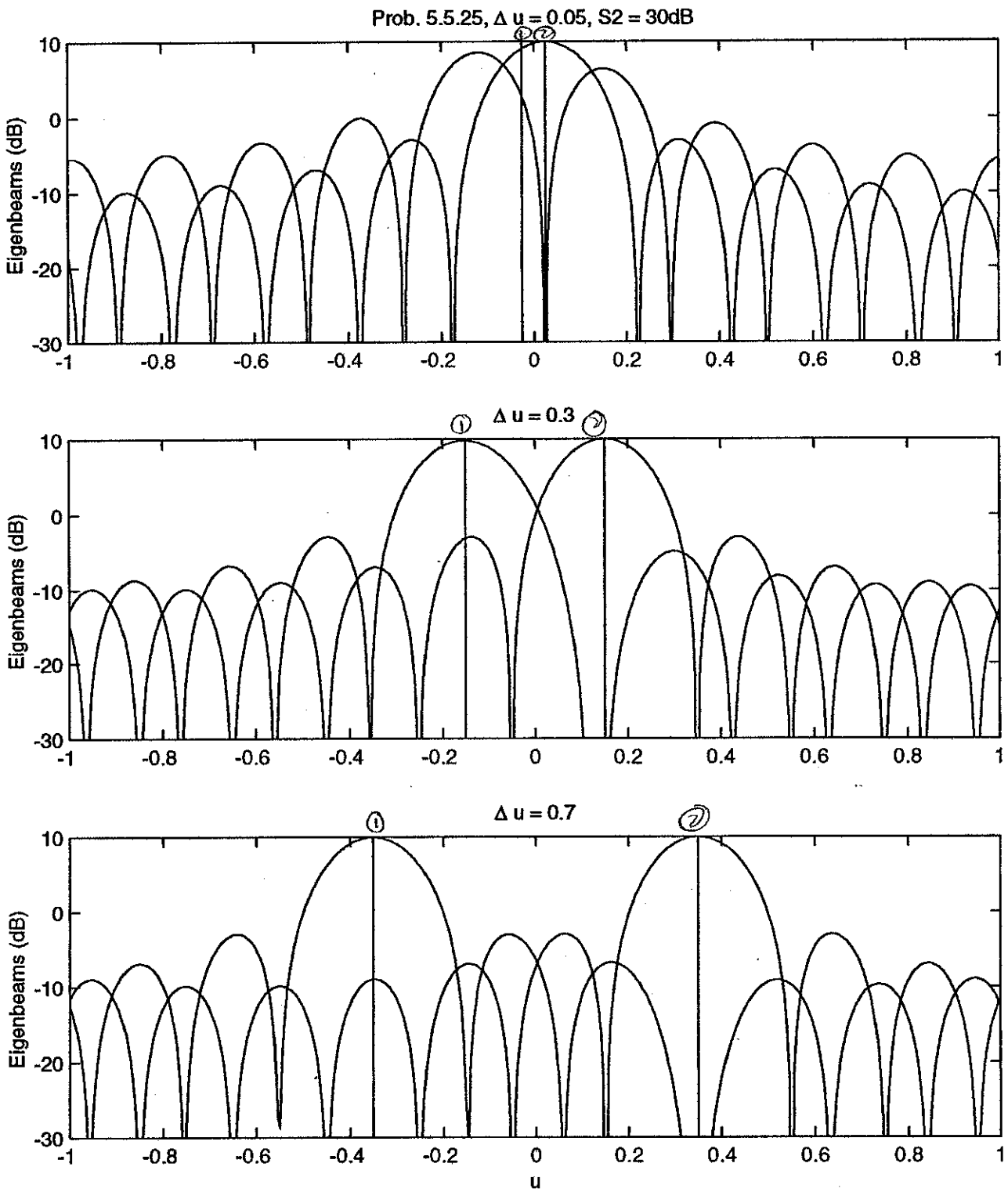
5.5.25 4/6


Prob. 5.5.25, Δ u = 0.05, S2 = 10dB
Eigenbeams (dB)
10
0
-10
-20
-30
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
Δ u = 0.3
Eigenbeams (dB)
Δ u = 0.7
Eigenbeams (dB)
u

5.5.25 5/6


Prob. 5.5.25, Δ u = 0.05, S2 = 20dB
Eigenbeams (dB)
10
0
-10
-20
-30
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
Δ u = 0.3
Δ u = 0.7
u

S.S. 25 6/6


Prob. 5.5.25, Δ u = 0.05, S2 = 30dB
Δ u = 0.3
Δ u = 0.7
Eigenbeams (dB)
u
10
0
-10
-20
-30
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1