Please explain your answer.

5. Consider a MIMO system with the channel gain matrix $\mathbf{H} = \begin{bmatrix} 0.3+0.2j & 0.7 \\ 0.5 & 0.6+0.3j \end{bmatrix}$.

Assume that the transmit precoding and receiver shaping were used to transform this channel into parallel independent channels, and the transmit SNR=10 dB.

1. Find the precoding and shaping matrices.
2. Let the system bandwidth is 100 kHz. Which is the channel capacity under the parallel decomposition with the optimal power allocation across the subchannels?