Weakly Symmetric Parallel Channels

Let \( W_1(z_1|x) \) and \( W_2(z_2|y) \) be weakly symmetric. Then

\[
P_{xyz_1z_2}(x,y,z_1,z_2) = p(x)q(y)W_1(z_1|x)W_2(z_2|y).
\]

Also, \( z_1 \perp z_2 \).

Thus,

\[
I(x^1z_1z_2) = H(z_1z_2) - H_1 - H_2
\]

Since \( P_{z_1y}(z_1|y) = P_{z_1}(z_1)W_2(z_2|y) \),

\[
H(z_1z_2|y) = H(z_1) + H_2.
\]

\[
I(x^1z_1z_2|y) = H(z_1|y) - H(z_1xy)
\]

\[
= (H(z_1) + H_2) - (H_1 + H_2)
\]

\[
= H(z_1) - H_1.
\]

Similarly,

\[
I(y^1z_1|X) = H(z_2) - H_2,
\]

\[
I(y^1z_2) = H(z_1) + H(z_2) - [H(z_1) + H_2]
\]

\[
= H(z_2) - H_2
\]

\[
= I(y^1z_2|X),
\]

and \( I(x^1z_1y) = I(x^1z) \),
In this example, the pentagon is degenerate:

\[ H(z_1) + H(z_2) - H_1 - H_2 \]

\[ H(z_1) - H_2 \]

\[ R_1(p,q) \]

\[ (H(z_1) - H_1) + (H(z_2) + H_2) \]

Largest rectangle is \([0, c(w_1)] \times [0, c(w_2)]\)

Since \(H(z_1) - H_1\) depends only on \(p\) and \(H(z_2) - H_2\) depends only on \(q\).