PROBLEMS V

1. SHOW, USING THE PROPERTIES OF DETERMINANTS, THAT

$$(b_1^+ b_2^+ + b_2^+ b_1^+)|\mathcal{K}\rangle = 0$$

FOR EVERY $|\mathcal{K}\rangle$ IN THE SET

$$\{|x_1 x_2\rangle, |x_1 x_3\rangle, |x_1 x_4\rangle, |x_2 x_3\rangle, |x_2 x_4\rangle, |x_3 x_4\rangle\}$$

2. SHOW, USING THE PROPERTIES OF DETERMINANTS, THAT

$$(b_1 b_2^+ + b_2^+ b_1)|\mathcal{K}\rangle = 0$$

$$(b_1 b_1^+ + b_1^+ b_1)|\mathcal{K}\rangle = |\mathcal{K}\rangle$$

FOR $|\mathcal{K}\rangle = \{|x_1 x_2\rangle, |x_1 x_3\rangle, |x_1 x_4\rangle, |x_2 x_3\rangle, |x_2 x_4\rangle, |x_3 x_4\rangle\}$

3. SHOW USING SECOND QUANTIZATION THAT

$$\langle x_i | x_j \rangle = \delta_{ij}$$

4. GIVEN A STATE

$$|\mathcal{K}\rangle = |x_1, x_2, \ldots x_N\rangle = b_1^+ b_2^+ \ldots b_N^+ |\ \rangle$$

SHOW THAT $\langle \mathcal{K} | b_i^+ b_j | \mathcal{K}\rangle = 1$ IF $i = j$ AND $i \in \{1, 2, \ldots N\}$ OTHERWISE IS ZERO