1 Hermitian Adjoints

Calculate the following quantities for the matrices:

$$A \doteq \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix} \qquad B \doteq \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & j \end{pmatrix} \qquad C \doteq \begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$$

and the vectors:

$$|D\rangle \doteq \begin{pmatrix} 1 \\ i \\ -1 \end{pmatrix} \qquad |E\rangle \doteq \begin{pmatrix} 1 \\ i \end{pmatrix} \qquad |F\rangle \doteq \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

(a) $A^\dagger$

(b) $|E\rangle^\dagger \equiv \langle E|$

(c) $\langle D|A|D\rangle$

(d) $(A|D\rangle)^\dagger$

(e) Using explicit matrix multiplication (without using a theorem) verify that $(A|D\rangle)^\dagger = \langle D|A^\dagger$