

## 1 Matrix Exponentiation

Exponentiate the following matrices *by hand*:

(a)  $P = \begin{pmatrix} i\alpha & 0 \\ 0 & 0 \end{pmatrix}$

(b)  $Q = \begin{pmatrix} 0 & i\beta \\ 0 & 0 \end{pmatrix}$

(You may check your answers using computer algebra, but should attempt the calculation first without such assistance.)