

Question 10 (7 marks)

A particle P moves such that at time t its position vector $\underline{r}(t)$ from a fixed origin is given by

$$\underline{r}(t) = e^t \cos(t)\underline{i} + e^t \sin(t)\underline{j}, \quad 0 \leq t \leq \pi. \text{ The velocity vector of particle } P \text{ is denoted by } \dot{\underline{r}}(t).$$

- a. Determine the particle's initial velocity.

3 marks

- b. Show that $\underline{r}(t)$ always makes an angle of $\frac{\pi}{4}$ with $\dot{\underline{r}}(t)$.

4 marks

END OF QUESTION AND ANSWER BOOKLET