7 X is a random variable with probability density function given by

$$f(x) = \begin{cases} (1+\cos \pi x) & 0 \leqslant x \leqslant 1, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Show that $P\left(X < \frac{1}{2}\right) = \frac{1}{2} + \frac{1}{\pi}$. [3]

(b) Show that $E(X) = \frac{1}{2} - \frac{2}{\pi^2}$. [5]

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.