

1. Nov/2021/Paper_9709/31/No.8

The constant a is such that $\int_1^a \frac{\ln x}{\sqrt{x}} dx = 6$.

(a) Show that $a = \exp\left(\frac{1}{\sqrt{a}} + 2\right)$. [5]

[$\exp(x)$ is an alternative notation for e^x .]



(b) Verify by calculation that a lies between 9 and 11. [2]

(c) Use an iterative formula based on the equation in part (a) to determine a correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

The logo for PapaCandy is displayed diagonally across the page. It features the word "PapaCandy" in a bold, sans-serif font. The letter "P" is blue, "a" is red, and "Candy" is in red. Below the text is a graphic element consisting of a red and blue stylized 'Y' shape, with a small cluster of colorful dots (red, green, blue) at the bottom left corner.

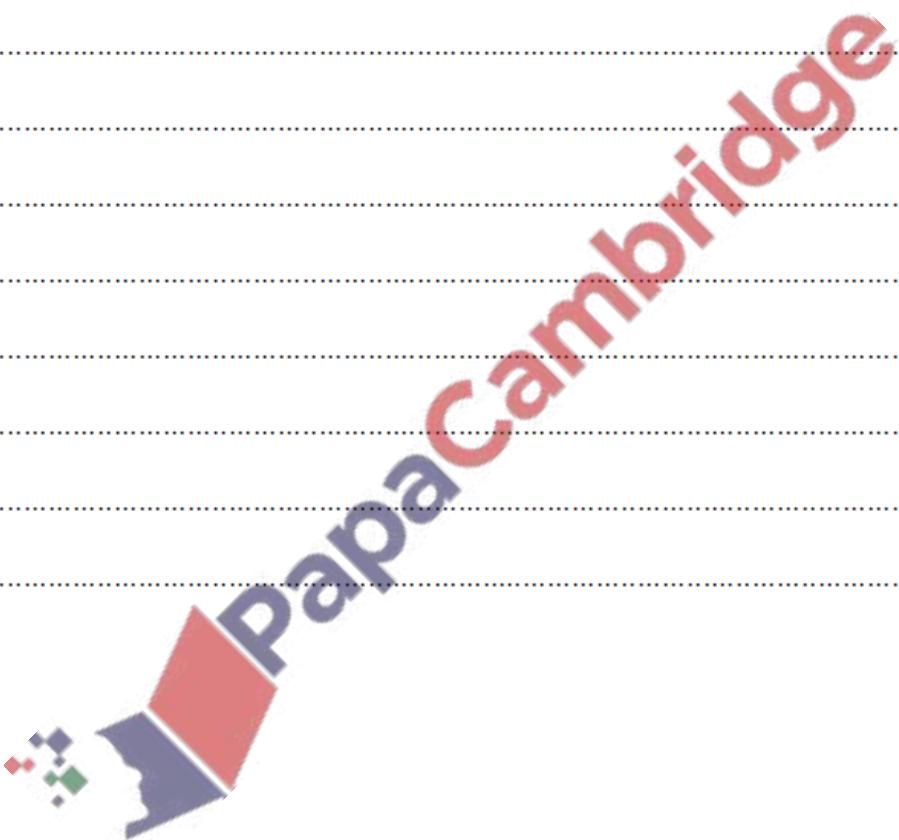
2. Nov/2021/Paper_9709/32/No.11(c)

(c) Use the iterative formula

$$a_{n+1} = \tan^{-1} \left(\frac{1}{3} (1 - \tan^2 a_n - \tan^3 a_n) \right)$$

to determine a correct to 2 decimal places, giving the result of each iteration to 4 decimal places.

[3]



3. Nov/2021/Paper_9709/33/No.11(c)

(c) (i) On a sketch of an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $0 \leq \arg(z - u) \leq \frac{1}{4}\pi$ and $\operatorname{Re} z \leq 2$. [4]

(ii) Find the greatest value of $|z|$ for points in the shaded region. Give your answer correct to 3 significant figures. [2]

