| Question Number | Scheme | | Marks |
|---|---|---|---|
| 1(a) | $1-\mathrm{F}(4)=1-\frac{3}{5}=\frac{2}{5}$ | $\int_4^5\left(\frac{2}{5}\right)\mathrm{d}x=2-\frac{8}{5}=\frac{2}{5}$ | M1A1 |
| | | | (2) |
| (b) | $\mathrm{F}(a)-\mathrm{F}(3)=0.642$ or $\mathrm{F}(a)-\mathrm{F}(4)=0.292$ or $\mathrm{F}(a)-0.25=0.642$ or $\mathrm{F}(a)-0.6=0.292$ | From $x = 3$ to 4: $\int_3^4\left(\frac{1}{10}x\right)\mathrm{d}x=\frac{7}{20}$ | M1 |
| | $\mathrm{F}(a)=0.892=\frac{223}{250}$ | From $x = 4$ to $a$: $\int_4^a\left(\frac{2}{5}\right)\mathrm{d}x=\left(\frac{2}{5}a-\frac{8}{5}\right)$ | A1 |
| | $\frac{1}{5}(2a-5)=\text{"0.892"}$ | $\frac{7}{20}+\frac{2}{5}a-\frac{8}{5}=0.642$ | M1 |
| | $a = 4.73$ | | A1 |
| | | | (4) |
| (c) | $\mathrm{f}(x)=\frac{\mathrm{d}}{\mathrm{d}x}(\mathrm{F}(x))=\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{20}(x^2-4)\right)=\frac{1}{10}x$ $\mathrm{f}(x)=\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{5}(2x-5)\right)=\frac{2}{5}$ | | M1 |
| | $\mathrm{f}(x)=\begin{cases}\frac{1}{10}x, & 2\le x\le 4\\ \frac{2}{5}, & 4<x\le 5\\ 0, & \text{otherwise}\end{cases}$ | | A1A1B1 |
| | | | (4) |

| | Notes | | Total 10 |
|---|---|---|---|
| (a) | **M1** | For 1 – F(4) seen or used. May be implied by $\frac{2}{5}$ oe Allow1 – P($X \le 4$) or a correct integral with limits seen or used | |
| | **A1** | Oe | |
| (b) | **M1** | for $\mathrm{F}(a)-\mathrm{F}(3)=0.642$ seen or used or F($a$) – F(4) = 0.292 seen or used or for correct attempt at area from 3 to 4 or 4 to $a$ Allow P($X \le$ a) – P($X \le$ 3) = 0.642 or P($X \le$ a) – P($X \le$ 4) = 0.292<br>Allow any letter for $a$ May be implied by $\mathrm{F}(a)=0.892$ | |
| | **A1** | for $\mathrm{F}(a)=0.892$ oe or for either correct area | |
| | **M1** | For solving $\frac{1}{5}(2a-5)=\text{"0.892"}$ ft their 0.892 Allow any letter for $a$ or for total area = 0.642<br>ISW e.g. $\frac{1}{20}\left(a^2-4\right)=0.892$ **SC use of a – 1 leading to 5.73 scores M1** | |
| | **A1** | Cao If 4.67 is shown as well then it must be rejected | |
| (c) | **M1** | For attempt at differentiation of either line of cdf $(x^n \to x^{n-1})$ May be implied by either of the first two lines of the cdf above correct | |
| | **A1** | For $\frac{1}{10}x$ (must be on its own) with correct limits | |
| | **A1** | For $\frac{2}{5}$ (must be on its own) with correct limits | |
| | **B1** | for the 3rd line of the cdf above Allow 0 for $x < 2$ and 0 for $x > 5$ for 0 otherwise<br>Allow use of ≤/≥ for this mark only | |