| Question number | Scheme | Marks |
|---|---|---|
| 9 | $\frac{dy}{dx} = -(x^3 - 2x)e^{1-x} + (3x^2 - 2)e^{1-x}$ | M1 A1 |
| | When $x = 1$ $\frac{dy}{dx} = 2$ $\Rightarrow$ Gradient of **normal** = $-\frac{1}{"2"}$ | M1 |
| | $(y+1) = -\frac{1}{2}(x-1)$ oe and isw once seen | M1 A1 (5) |
| | | **Total 5 marks** |

| Mark | Notes |
|---|---|
| **M1** | For the use of product rule.<br>This is not given on page 2 so please mark as follows:<br>• There must be an acceptable attempt to differentiate both terms. For this question<br>$x^3 - 2x \to ax^2 + b \quad a, b \neq 0$<br>$e^{1-x} \to \pm e^{1-x}$<br>• Allow their $u\frac{dv}{dx} \pm v\frac{du}{dx}$ (as long as it fulfils these minimum conditions)<br>$\frac{dy}{dx} = -(x^3 - 2x)e^{1-x} + (3x^2 - 2)e^{1-x}$ |
| **A1** | For the correct simplified or unsimplified $\frac{dy}{dx}$ as shown above. |
| **M1** | For substituting $x = 1$ correctly into their $\frac{dy}{dx}$ to obtain a value for the gradient of the **normal**.<br>When $x = 1$ $\frac{dy}{dx} = "2" \Rightarrow m_n = -\frac{1}{"2"}$ (must come from their $\frac{dy}{dx}$) |
| **M1** | For correctly forming an equation using the given coordinates with their gradient of the normal which is the negative reciprocal of their value of $\frac{dy}{dx}$<br>$(y+1) = -\frac{1}{2}(x-1)$<br>If $y = mx + c$ is used, then they must find a value for $c$ and find an equation.<br>$c = -\frac{1}{2}$ so $y = -\frac{x}{2} - \frac{1}{2}$ oe |
| **A1** | For the correct equation as shown above in any form. |