

## LC 2016 (SET A): PAPER 1

### QUESTION 3 (25 MARKS)

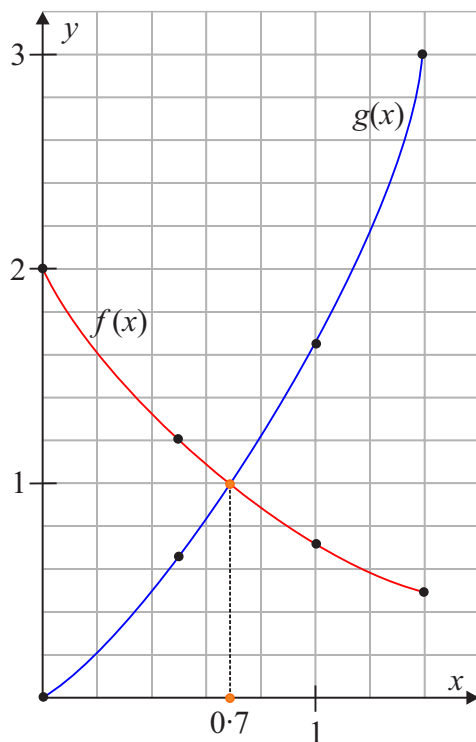
#### Question 3 (a) (i)

$$f(0) = \frac{2}{e^0} = \frac{2}{1} = 2, f(0.5) = \frac{2}{e^{0.5}} = 1.21, f(1) = \frac{2}{e^1} = 0.74, f(\ln 4) = \frac{2}{e^{\ln 4}} = \frac{2}{4} = 0.5$$

$$g(0) = e^0 - 1 = 1 - 1 = 0, g(0.5) = e^{0.5} - 1 = 0.65, g(1) = e^1 - 1 = 1.72, g(\ln 4) = e^{\ln 4} - 1 = 4 - 1 = 3$$

$x$	0	0.5	1	$\ln(4) \approx 1.4$
$f(x) = \frac{2}{e^x}$	2	1.21	0.74	0.5
$g(x) = e^x - 1$	0	0.65	1.72	3

#### Question 3 (a) (ii)



#### Question 3 (b)

$$f(x) = g(x) \Rightarrow \frac{2}{e^x} = e^x - 1 \quad [\times e^x]$$

$$2 = (e^x)^2 - e^x$$

$$(e^x)^2 - e^x - 2 = 0$$

$$(e^x + 1)(e^x - 2) = 0$$

$$e^x = -1 \quad [\text{No solutions}]$$

$$e^x = 2 \Rightarrow \ln(e^x) = \ln 2$$

$$x \ln e = \ln 2$$

$$\therefore x = \ln 2 = 0.693$$

#### Question 3 (a) (iii)

$$f(x) = g(x) \Rightarrow x \approx 0.7$$

#### MARKING SCHEME NOTES

##### Question 3 (a) (i) [Scale 5C (0, 2, 4, 5)]

2: • one entry correct

4: • 5 entries correct

##### Question 3 (a) (ii) [Scale 5C (0, 2, 4, 5)]

2: • one plot correct

4: • 5 plots correct

• one correct graph

• no labelling

#### NOTES:

- straight lines NOT acceptable

- one clear label merits full credit

- one ambiguous label merits High Partial Credit at most

##### Question 3 (a) (iii) [Scale 5B (0, 2, 5)]

2: • point of intersection clearly indicated on graph, but value of  $x$  not stated

#### MARKING SCHEME NOTES

##### Question 3 (b) [Scale 10C (0, 3, 7, 10)]

3: • substitution correct

7: • correct factors of quadratic

• root formula correctly substituted

$$e^x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-2)}}{2(1)}$$

**NOTE:** oversimplification of equation (i.e. not treating as quadratic) merits Low Partial Credit at most