

Name:

Date:

Logarithmic & Exponential Function _IB Exam Style Questions

1. [Maximum Marks: 6]

GDC

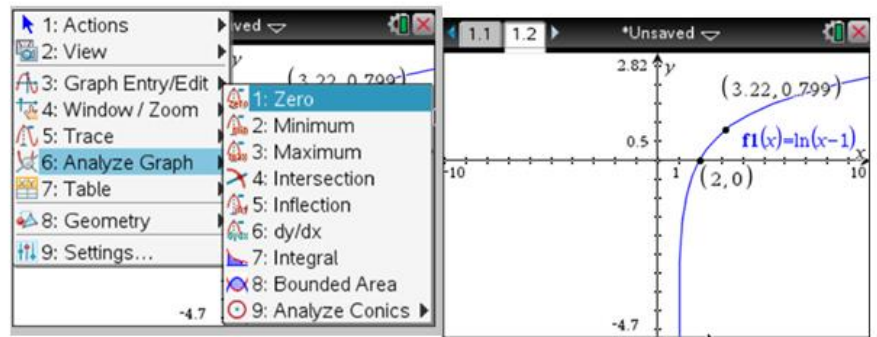
Let $f(x) = \ln(x-1)$, $x > 1$ and $g(x) = e^{3-x}$, $x > 0$

(a) Write down the x-intercept of the graph of f. [2 mark]

(b) i) Write down $f(1.001)$. [1 mark]ii) Write down $g(2)$. [1 mark]

(c) Find the coordinates of the point of intersection of the graphs of f and g. [2 marks]

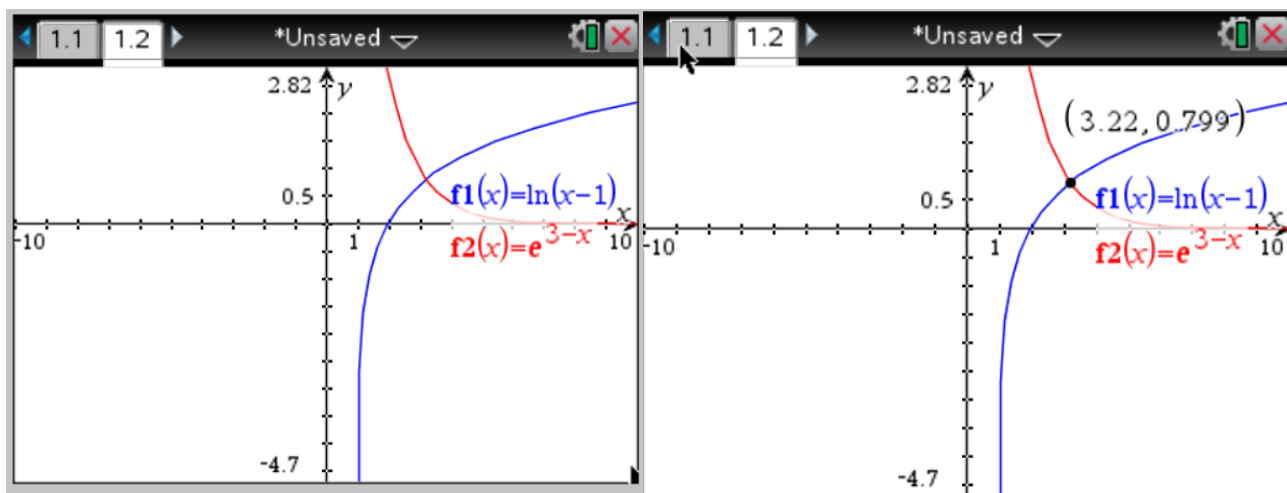
a) $f(x) = \ln(x-1)$
 x intercept when $y = 0$ M1
 $\ln(x-1) = 0$
 $x-1 = e^0$
 $x = 1+1$ A1
 $\boxed{x = 2}$



b) i) $f(1.001) = \ln(1.001-1)$
 $= \ln(0.001)$
 $= \ln(10^{-3})$
 $= -3 \ln 10$ A1
 ≈ -6.90755

ii) $g(2) = e^{3-2} = e^1 \approx 2.71828$ A1

c) $f(x) = g(x)$ M1
 $\ln(x-1) = e^{3-x}$ for $x > 1$
 By using G.D.C
 $x \approx 3.224$; $y \approx 0.799$ A1



2. [Maximum Marks: 6]

No_GDC

Solve for x where $9^{x+2} = 27^{3x-1}$

Take log on both sides M₁

$$\log 9^{x+2} = \log 27^{3x-1}$$

$$(x+2) \log 9 = (3x-1) \log 27 \quad \text{A}_1$$

$$(x+2) \log 3^2 = (3x-1) \log 3^3 \quad \text{A}_1$$

$$(x+2) 2 \log 3 = (3x-1) 3 \log 3 \quad \text{A}_1$$

$$(x+2) 2 = (3x-1) 3$$

$$2x+4 = 9x-3 \quad \text{A}_1$$

$$\Rightarrow 9x - 2x = +7$$

$$7x = 7$$

$$x = 1 \quad \text{A}_1$$

3. [Maximum Marks: 6]

No_GDC

Solve:

$$x^y = 3x - 4$$

$$\log_x 8 = y$$

$$x^y = 3x - 4 \rightarrow \textcircled{1}$$

$$\log_x 8 = y \rightarrow \textcircled{2}$$

Rewrite

$$x^y = 8$$

M1

A1

Substitute $x^y = 8$ in equ $\textcircled{1}$

M1

$$8 = 3x - 4$$

$$3x = 12$$

A1

$$x = \frac{12}{3} = 4$$

4 -

Substitute 'x' value in $x^y = 8$

M1

$$4^y = 8$$

$$2^{2y} = 2^3 \Rightarrow 2y = 3$$

$$y = \frac{3}{2} \quad \text{A1}$$