

## LOGARITHMS & EXPONENTIALS ASSESSMENT TASK

- |     |   | <b>Marks</b> |
|-----|---|--------------|
| (1) | Given that $\log_x 5 = 1.32$ and $\log_x 6 = 1.78$ , find :   | <b>6</b>     |
|     | (a) $\log_x 25$ (b) $\log_x (1.2)$  |              |
|     | (c) $\log_x 1$ (d) $\log_x 6x$  |              |
| (2) | (a) Evaluate $\log_3 \left( \frac{1}{27} \right)$   | <b>4</b>     |
|     | (b) Calculate $\log_2 5$ correct to <i>two</i> decimal places.  |              |
| (3) | Sketch the graph, without calculus, the function $y = \log_e (x - 1)$ and state the domain and range.             | <b>2</b>     |
| (4) | Differentiate :    (a) $e^{5x+2}$ (b) $\ln(x+1)$  | <b>8</b>     |
|     | (c) $(2x+1)e^{3x}$ (d) $\frac{\ln x}{e^x}$  |              |
|     | (e) $[\log_e(2x) - 3]^5$  |              |
| (5) | Find :    (a) $\int e^{5-3x} dx$ (b) $\int \frac{1}{2x+1} dx$   | <b>5</b>     |
|     | (c) $\int_0^{\ln 2} \frac{e^x + 1}{e^x} dx$   |              |
| (6) | Find the equation of the tangent to the curve $y = x \ln x$ at the point on the curve whose $x$ -coordinate is 1. | <b>3</b>     |

- (7) At any point on the curve  $y = f(x)$ , the gradient function is given by **3**

$$\frac{dy}{dx} = \frac{2x}{x^2 + 1}$$

The point  $(0, 2)$  lies on the curve. Find the equation of the curve.

- (8) The region bounded by the curve  $y = e^{2x}$ , the line  $x = 1$  and the coordinates axes is rotated through  $360^\circ$  about the  $x$ -axis. **5**

- (a) Find the area of the region.  
(b) Find the volume of the solid of revolution.

- (9) Solve  $\log_2(x + 1) - \log_2(x - 1) = 2$ . **3**

- (10) (a) Use the trapezoidal rule with 3 function values to approximate

$$\int_1^2 xe^{x^2} dx.$$

- (b) Find the exact area of the above integral.  
(c) Calculate the percentage error.

- (11) A function is defined by the following :

$$f(x) = \begin{cases} e^{2x+1} & \text{for } x \geq 0 \\ e & \text{for } x < 0. \end{cases}$$

- (a) Sketch the above function.  
(b) Calculate the area under the curve and above the  $x$ -axis between  $x = -2$  and  $x = 2$ .

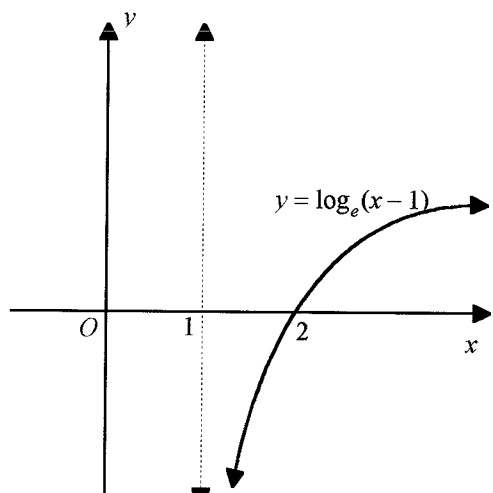
*End of Assessment Task*

### Answers to Logs & exponentials task

(1) (a) 2.64 (b) 0.46 (c) 0 (d) 2.78

(2) (a) -3 (b) 2.32

(3)



$D : x > 1$

$R : \text{All real } y$

(4) (a)  $5e^{5x+2}$

(b)  $\frac{1}{x+1}$

(c)  $e^{3x}(6x+5)$

(d)  $\frac{\frac{1}{x} - \ln x}{e^x}$

(e)  $\frac{5}{x}[\ln(2x) - 3]^4$

(5) (a)  $-\frac{1}{3}e^{5-3x} + c$

(b)  $\frac{1}{2} \ln(2x+1) + c$

(c)  $\ln 2 + \frac{1}{2}$

(6)  $x - y - 1 = 0$

(7)  $f(x) = \ln(x^2 + 1) + 2$

(8) (a)  $\frac{1}{2}(e^2 - 1)u^2$

(b)  $\frac{\pi}{4}(e^4 - 1)u^2$

(9)  $x = \frac{5}{3}$

(10) (a)

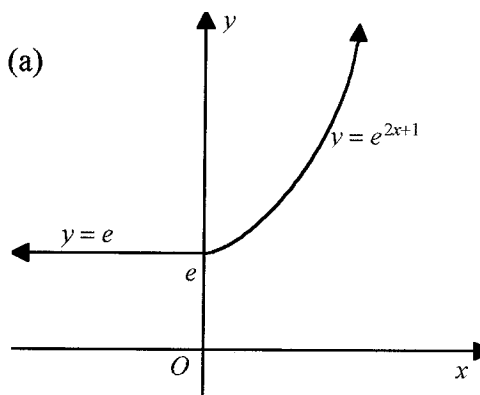
x	1	1.5	2
y	2.72	14.23	109.20

$A \approx 35.0945$  sq. units

(b)  $\frac{e}{2}(e^3 - 1)u^2$

(c)  $\approx 35\%$

(11) (a)



(b)  $\frac{e}{2}(3 + e^4)$ .