1

If $x = sec\, y$, where $y \in]\, \frac{\pi}{2}\, , \pi\, [$, then $\frac{dx}{dy}$ = ...

- $-x\sqrt{x^2-1}$
- $x\sqrt{x^2-1}$
- $-x\sqrt{x^2+1}$
- $x\sqrt{x^2+1}$

2

$$\lim_{x \to 1} \frac{e^x - e}{x - 1} = \text{.............}$$

- **e**
- **- e**
- **1**
- **- 1**

3

If $\lim_{x \to 0} \frac{\ln(x+1)^{\sqrt{k}}}{x} = 4$ **, then k =..........**

- **16**
- **4**
- **8**
- **2**

4

If $f(x) = \int \frac{1-(\ln x)^2}{x}\,dx$ **, where** $f(1) = 0$**, then** $f(e) =$ **.......**

- $\frac{2}{3}$
- $\frac{-2}{3}$
- $\frac{1}{3}$
- $\frac{-1}{3}$

5

If $y = \sin 3x$, then the differential of y = ...

- $3\cos 3x\,dx$
- $3\cos x\,dx$
- $-3\cos 3x\,dx$
- $-3\cos x\,dx$

6

$\int \frac{9}{2}\sqrt{x}\ \ln x\ dx =$ **........** $+\ c$ **where *c* is constant**

- $x^{\frac{3}{2}}(\ln x^3 - 2)$
- $x^{\frac{3}{2}}(\ln x - 2)$
- $x^{\frac{3}{2}}(\ln x^3 + 2)$
- $x^{\frac{3}{2}}(\ln x + 2)$

7

If the function f is differentiable twice on the interval[-1 , 1] where $f'(x)$ is increasing on]-1 , 0[and $f'(x)$ is decreasing on]0 , 1[,

then the statement which must be true from the following is..........

- (0 , $f(0)$) is an inflection point.
- $f(0)$ is a local maximum value.
- The function f is increasing on]0 , 1[
- The function f is decreasing on]0 , 1[

8

If $f(\frac{1}{2}x) = |x|^3$ **, then** $f^{\backslash\backslash}$ **(-1) =.........**

- **48**
- **14**
- **1**
- **-48**

9

If $y = f(X)$ where $y = \sqrt[3]{n^2+7}$, $6n^2x + n = 1$,

then the normal to the curve of the function at a point lies on it which its X - coordinate equals zero is ......

- **parallel to the straight line $y = X$**
- **parallel to X - axis**
- **parallel to Y - axis**
- **parallel to the straight line $y = -X$**

10

If $y = e^{x} \sec x$, then $\dfrac{dy}{dx} = ...$ at $x = \text{zero}$

- **1**
- **-1**
- **2**
- **- 2**

11

The function f : [-3,-1] $\rightarrow$ R where $f(x) = x + \frac{a}{x}$. if the absolute maximum value of f equals -2 and f is increasing on the interval]-3 , -1[, then a =........

- 1
- -1
- 2
- -2

12

The slope of the tangent to the curve $y = 5^x \log_5(x+1)$ at $x = 0$ **equals..........**

- $\log_5 e$
- **ln 5**
- **zero**
- $5 \log_5 e$

13

If $y \times \log_{(x^3)} e = 1$ where $x > 1$, then $\frac{dy}{dx} = \text{..........}$ at $x = 3$

- **1**
- **zero**
- **3 ln 3**
- **ln 3**

14

If: a , b $\in]\,0\,,\,\frac{\pi}{2}[$ **then:**

$$\int_a^b \tan^2 x\,dx + \int_b^a \sec^2 x\,dx = \ldots\ldots\ldots\ldots$$

- a - b
- b - a
- **1**
- **tan b - tan a**

15

If y > 0 then the point lies on the curve $y^2 = 8x$ **at which** $\frac{dy}{dx} = \frac{dx}{dy}$ **is.........**

- **(2 , 4)**
- $(\frac{1}{2}, 2)$
- $(1, 2\sqrt{2})$
- **(0 , 0)**

16

If $y = a\,e^{bx}$ *and* $\frac{d^2y}{dx^2} = y$, then $b^2 = \ldots\ldots\ldots\ldots$

- **1**
- **0**
- **-1**
- **2**

17

The maximum value of the function *f* (*X*)= sin *X* + cos *X* in the interval $]0, \frac{\pi}{2}[$ **is ....**

- $\sqrt{2}$
- 1
- $\frac{\sqrt{2}}{2}$
- $\frac{1+\sqrt{3}}{2}$

18

If sin X cos y = $\frac{1}{2}$ where X and y are the measures of two acute angles, then $\frac{dy}{dx}$ = ... at $X = \frac{\pi}{4}$

- **1**
- **-1**
- **0**
- $\frac{1}{2}$

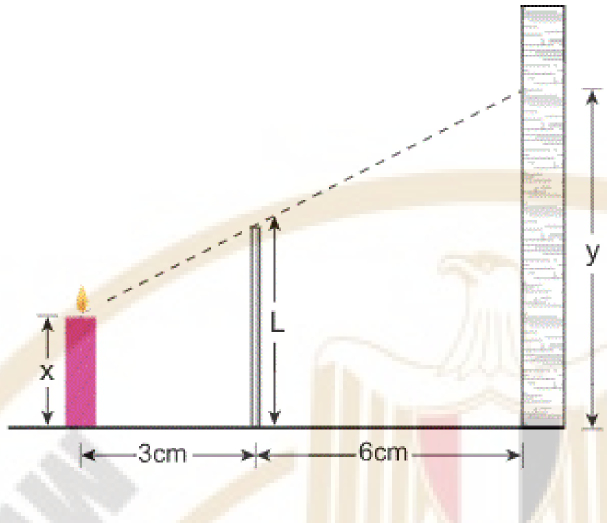
19

If $\frac{dz}{d\theta} = \cos 2\theta$, $\frac{dy}{d\theta} = \sin 2\theta$,

then $\frac{d^2y}{dz^2}$ =............at $x = \frac{\pi}{8}$

- $4\sqrt{2}$
- **4**
- $2\sqrt{2}$
- **2**

20

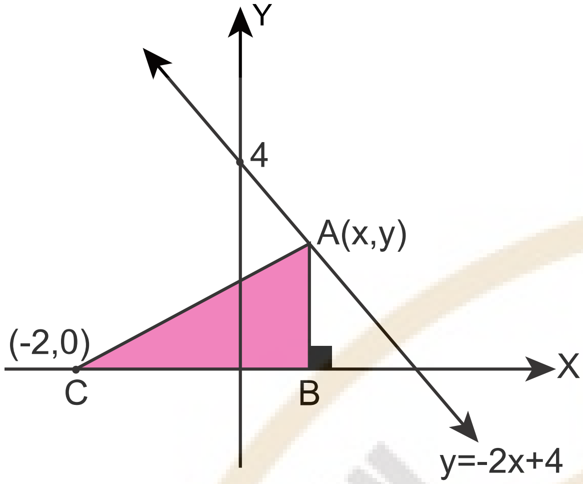


In the opposite figure:

A candle is placed at 3 cm from a wooden block of height L cm, the wooden block is at a distance 6 cm from a vertical wall as shown in the figure.
if the length of the candle (x) decreasing by rate 3 cm/hr.
then the rate of change of the length of the shadow of block (y) on the wall is...........cm/hr

- **6**
- **-6**
- **-3**
- **3**

21



In the opposite figure:

If the point $A(x\ ,y)$ is moving on the straight line whose equation $y = -2x + 4$

where $0 \le x \le 1$, the point B is the projection of A on the $X-$axis and c(-2 , 0),

then the smallest area of Δ ABC is........... square unite

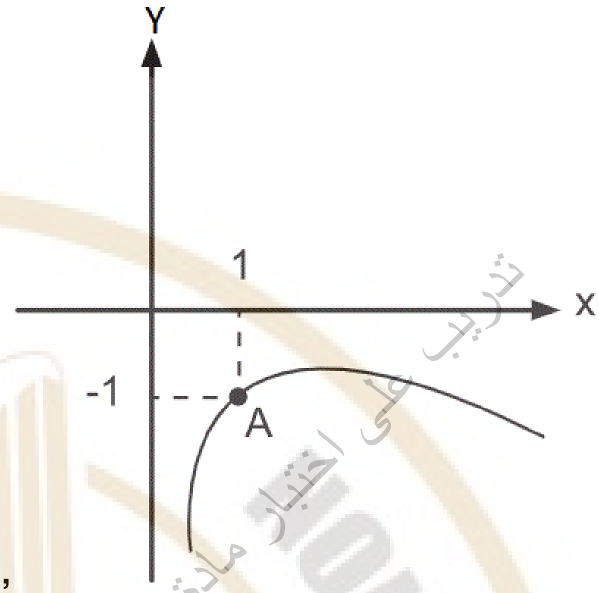
- **3**
- **4**
- **2**
- **5**

If the equation of the tangent to the curve $y = -\ln x$ **at the point** (a , b) **which lies on the curve is** $y = mx$ **,**

then $a = ...$

- e
- $\frac{3}{2}e$
- $\frac{1}{2}e$
- $2\sqrt{e}$

23



The opposite figure representing the curve $e^{x+y} = 3x - 2$,

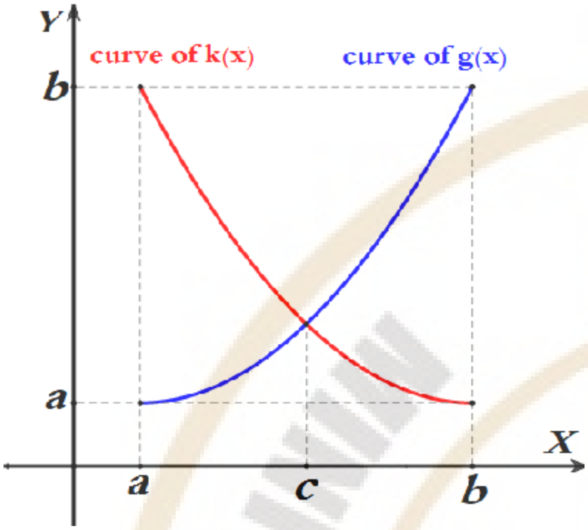
and the tangent to the curve at the point A(1 , -1) intersecting the axes of coordinates $\overleftrightarrow{XX'}$, $\overleftrightarrow{YY'}$ at the two points B and C respectively then A divides $\overrightarrow{BC}$ by ratio............

- 1 : 2 internally
- 2 : 1 internally
- 1 : 2 externally
- 2 : 1 externally

24

The opposite figure represents the curves of the two functions g , k on the interval [A , B].

If f is a function where $f(x) = (g \circ k)(x)$ then the correct statement from the following is..........



- **The function f is decreasing on the interval] A , B [**
- **The function f is increasing on the interval] A , B [**
- **The function f is increasing on the interval] A , C [only**
- **The function f is decreasing on the interval] A , C [only**

25

In the interval] 0 , 1 [the function g is differentiable twice and g''$(x) < 0$,

if f **is function where** $f(x) = g(x) + g(1 - x)$ **then the correct statement from the following is..........**

- f **is decreasing on**] $\frac{1}{2}$, 1 [
- f **is decreasing on**] 0 , 1 [
- f **is increasing on**] 0 , 1 [
- f **is increasing on**] $\frac{1}{2}$, 1 [