QUESTIONNAIRE Mathematics Test 9. Population 3a

QUESTION 1
In a Cartesian co-ordinate system, what is the equation of the straight line passing through the point (0, -5) and parallel to the straight line whose equation is y = 2x + 3 ?

A. x + 2y + 5 = 0
B. 2x - y - 5 = 0
C. 2x + 3 = -5
D. 2x - 5y + 3 = 0
E. 2x + y + 5 = 0

QUESTION 2
An open cylindrical vessel of capacity 9000ã c.c. is to be made with the curved surface of sheet metal and a wooden base. If the weight of 1 sq. cm. of the metal is three times the weight of 1 sq. cm. of the wood, each being of uniform small thickness, what will be the radius of the vessel (in cms.) when its total weight is a minimum?

_____

QUESTION 3

The derivative with respect to x of $\frac{4}{\sqrt{(3x - 4)}}$ is

A. $12\sqrt{3x - 4}$
B. $4 / \sqrt{3}$
C. $\frac{-2}{(3x - 4)^{3/2}}$
D. $\frac{-6}{(3x - 4)^{3/2}}$
E. $6\sqrt{3x - 4}$

QUESTION 4

The value of $\int_0^1 \frac{dx}{x^2 - 5x + 6}$ is:

A. $-\log_e 2$
B. $-\frac{1}{3}$
C. $\log_e \frac{4}{3}$
D. $\tan \frac{-11}{4}$
E. $-\frac{1}{2}$

QUESTION 5

$\int (x - 1)^2 \, dx$ is equal to

A. $2(x - 1) + c$

B. $\frac{1}{2}(x - 1)^2 + c$

C. $\frac{1}{3}(x - 1)^3 + c$

D. $\frac{1}{3}(x^3 - x) + c$

E. $\frac{(x - 1)^3}{x} + c$

QUESTION 6

Determine k so that the graph of the function $y = 3x^3 + 6x^2 + kx + 9$ has a point of inflection and a horizontal tangent for the same value of x.

_____

QUESTION 7

What is the equation in x and y of the curve with parametric equations

$$x = t + \frac{1}{t}, \quad y = t - \frac{1}{t} \; ?$$

A. $x + y = 1$

B. $x + y = 2$

C. $x^2 + y^2 = 4$

D. $x^2 - y^2 = 4$

E. $2x^2 - y^2 = 4$

QUESTION 8

[Picture]

The graph of a polynomial function of x is shown in the diagram above, the equation of the curve being y = f(x). Which of the following statements is (are) true for that part of the curve for which a ó x ó b ?

I. f"(c) = 0 for some value c between a and b.

II. $\frac{f(b) - f(a)}{b - a} = f''(c)$ for some value c between a and b.

III. If there is a point of inflexion at Q, f"(b) can have no value but 0.

IV. $\int_a^b f(x)\,dx < \frac{1}{2}(b - a)[f(a) + f(b)]$

A. All four
B. II, III and IV
C. I and II
D. I and III
E. II and IV

QUESTION 9

Given that $3\frac{dy}{dx} = xy - 5$, and y = 1 when x = 2.

What is the value of y when x = 0 ?

A. - 5/3 B. - 2/3 C. 1/3 D. 25/9 E. 31/9

QUESTION 10-11 / 2

Problems 10 and 11 are based on the figure shown below, which shows a graph of $y = f(x)$, a being less than b. S_1 is the area enclosed by the x-axis, $x = a$, and $y = f(x)$. S_2 is the area encloscd by the x-axis, $x = b$, and $y = f(x)$. S_1 and S_2 are to be considered positive.

[Picture]

10. The value of $\int_a^b f(x)\,dx$ is

A. $S_1 + S_2$

B. $S_1 - S_2$

C. $S_2 - S_1$

D. $|S_1 - S_2|$

E. $\frac{1}{2}(S_1 + S_2)$

11. The value of $\int_a^b |f(x)|\,dx$ is

A. $S_1 + S_2$

B. $S_1 - S_2$

C. $|S_2 - S_1|$

D. $|S_2| - |S_1|$

E. $\frac{1}{2}(S_1 + S_2)$

QUESTION 12

The function $f(x) = \frac{xy - 1}{x - 1}$ is defined and continuous for all x except $x = 1$. What value must be assigned to $f(x)$ for $x = 1$ in order that the function be continuous there?

_____

QUESTION 13

Find the difference $\vec{b} - \vec{a}$ of the vectors $\vec{a} = (4, 2)$ and $\vec{b} = (0, 3)$.

A. (-4, -2)
B. (-4, 1)
C. (4, -1)
D. (4, 2)
E. (4, 5)

QUESTION 14

In a triangle with area a, the mid-points of the three sides are joined

so as to form a new triangle. In the triangle thus constructed, another new triangle is inscribed in the same way. This process is continued indefinitely. What is the sum of all of the areas of this sequence of triangles including the original one?

A. $\frac{9a}{7}$ B. $\frac{4a}{3}$ C. $\frac{7a}{5}$ D. $\frac{3a}{2}$ E. $\frac{5a}{3}$

QUESTION 15

The value of $\lim_{h \to 0} \frac{\sqrt{\sqrt{2} + h} - \sqrt{\sqrt{2}}}{h}$ is

A. 0 B. $\frac{1}{2\sqrt{2}}$ C. $\frac{1}{2}$ D. $\frac{1}{\sqrt{2}}$ E. ∞