

Time:
2 hours

The experimental test for the third secondary stage in
Differentiation and integration
In the academic year 2014 – 2015

(الاسئلة في صفتين)

يسمح باستخدام الالة الحاسبة

First: Answer the following question (mandatory):

First question: complete the following statements to be correct:

- a) The function $f(x)$ is differentiable at $X = a$ if
- b) If $f(x) = h(x) - k(x)$ where: $h'(2) = k'(2)$, $h''(2) > k''(2)$, then at $X = 2$ the function $f(x)$ has a localvalue .
- c) The equation of normal to the curve of the function: $y^2 = x$ at the point $(1, 1)$ lies on it is
- d) If $f(x) = \begin{cases} a \cos x + \frac{15 \sin x}{x} & x > 0 \\ \frac{x^6 - 64}{x^3 - 8} & x < 0 \end{cases}$ has a limit at $x = 0$, then $a = \dots\dots\dots$
- e) The function $f(x) = \tan x$ is continuous on
- f) If the side length of a square increases by the rate 3 cm/sec. ,then at the side length equals 5 cm ,the area of the square will increase by the ratecm² / sec

Second: Answer three of the following questions:

Second question:

- a) If the function $f(x) = \begin{cases} x + 1 & x \geq 1 \\ 3 - a x^2 & x < 1 \end{cases}$ is continuous at $x = 1$

Find the value of a , then discuss the differentiability of this function at $x = 1$

- b) Prove that the two curves: $y = \frac{x}{2-3x}$ and $y = (x - 2)^8 (1 - 2x)^3$ has a common tangent at the point $(1, -1)$ and find its equation .

Third question:

- a) Find : i) $\int \left(\frac{\sin 2x}{\cos 2x + 1} \right)^2 dx$ ii) $\int \frac{x+3}{\sqrt{x+4}} dx$
- b) Find the intervals over which the graph of the function $f(x) = \frac{x^2+9}{x}$ is convex downwards and convex upwards .Find also the point of inflection of the function if it exists then determine the absolute minimum value and the absolute maximum value for the function $f(x)$ when $X \in [1, 6]$

باقي الاسئلة في الصفحة التالية

Fourth question:

- a) If $y = (x + \sqrt{x^2 + 1})^4$, Prove that: $(x^2 + 1)y'' + xy' = 16y$
- b) If the internal radius r_1 of a hollow sphere increasing at rate of 1 cm/sec., while the volume of the material of the sphere remains constant, Find the rate of change of its outer radius r_2 when its radii r_1 and r_2 are 3 cm and 9 cm.

Fifth question:

- a) If the slope of the normal to the curve of a function at any point on it equals $(2Y + 1) \csc X$, If the curve of the function passes through the origin. Find the equation of the curve.

- b) The upper corner of a rectangular Piece of paper whose dimensions are 8 cm and 12 cm is folded over the lower part of the rectangle to lie on the lowest edge as shown in the opposite figure. Find the value of x in which y has a minimum value.

