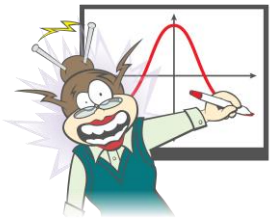

Mathematical Methods with TI-Nspire™ CX CAS

Exam-Style Questions

Part 2: Calculus

Webinar questions and student revision questions

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Each of the questions included here can be solved using the TI-Nspire CX technology.

Question 1

Let $g : R \to R, g(x) = -x^3 - 3x^2 + 24x - 8$.

(a) Find $g'(x)$.

(b) Determine the coordinates and the nature of the stationary points on the graph of g.

Response:

Question 2

Let $f : R \to R, f(x) = xe^{-x^2}$.

(a) Find $f'(x)$.

(b) Determine the exact coordinates and the nature of the stationary points on the graph of f.

Response:

Question 3

Over a particular 24-hour period at town H, the temperature, $h°\text{C}$, at time t hours after 6am can be modelled by $h(t) = -\frac{1}{18}(t-12)^2 + 25,\ 0 \le t \le 24$.

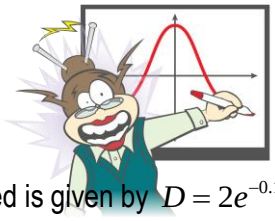
Over the same 24-hour period at town W, the temperature, $w°\text{C}$, at time t hours after 6am can be modelled by $w(t) = 21 - 4\cos\left(\frac{\pi t}{12}\right),\ 0 \le t \le 24$.

The difference in temperature, $d°\text{C}$, is given by $d(t) = h(t) - w(t),\ 0 \le t \le 24$.

(a) Find, correct to two decimal places, the values of t for which the maximum difference in temperature occurs.

(b) Find, correct to one decimal place, the maximum difference in temperature.

Response:



Question 4

The amount of drug, D milligrams, in the bloodstream at time t hours after it is administered is given by $D = 2e^{-0.1t}$, $0 \le t \le 2$. Find the average amount of drug present in the bloodstream over the first 2 hours after it was administered. Give your answer correct to two decimal places.

Response:

Question 5

The air temperature in a particular suburb during a period of 12 hours can be modelled by $W = 12 + 3t - 0.17t^2$, $0 \le t \le 12$, where t is measured in hours and W in degrees Celsius. Find, correct to the nearest tenth of a degree, the average temperature during the entire 12-hour period.

Response:

Question 6

The exact minimum value of the function defined by $f : [0, \pi] \to R$ where $f(x) = \frac{x}{2} + \cos(x)$ is

A $\frac{\pi}{6}$ B $\frac{5\pi}{6}$ C $\frac{\pi}{12} + \frac{\sqrt{3}}{2}$ D $\frac{5\pi}{12} - \frac{\sqrt{3}}{2}$ E 0

Response:

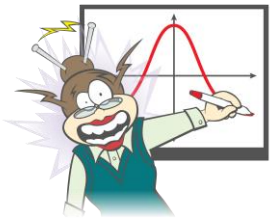
Question 7

The tangent to the curve $y = e^{x^2}$ at $x = 2$ meets the y- axis at the point

A $(0, 7e^4)$ B $(0, 3e^4)$ C $(0, 0)$

D $(0, -3e^4)$ E $(0, -7e^4)$

Response:



Question 8

If $\int_0^{\pi} k\sin(x)\,dx = 10$, then the value of k is

A -10 B -5 C $\frac{10}{\pi}$ D 5 E 10

Response:

Answers

1 (a) $g'(x) = -3x^2 - 6x + 24$ (b) $(-4, -88)$ local min and $(2, 20)$ local max

2 (a) $f'(x) = (1 - 2x^2)e^{-x^2}$ (b) $\left(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2e}}\right)$ local min and $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2e}}\right)$ local max

3 (a) $t = 3.93, 20.07$ (hours) (b) $2.4°C$

4 1.81 (mg)

5 $21.8°C$

6 D

7 E

8 D