Check Your Knowledge 4

This is a preview of the published version of the quiz

Started: Nov 10 at 9:02pm

Quiz Instructions

Question 1

0 pts

Suppose the function f with $f(x) = \frac{a}{2}x^2 + (1-a^2)x + 5a^4$. Find $a \in \mathbb{R}\backslash\{0\}$ so that f has a local minimum at $x_0 = \frac{48}{7}$.

- ○ -3
- ○ 0
- ○ 7
- ○ 12

Question 2

1 pts

Consider the function f with $f(x) = 3x^2 - e^{2a+1}x + 2e^{2a}$, $a \in \mathbb{R}$. Find $a \in \mathbb{R}$ so that the minimum value of f becomes maximum.

- $\frac{e^{12}-3}{3}$
- $\frac{2+\ln(3)}{3}$
- $\frac{\ln(12)-2}{2}$
- -4

Question 3

1 pts

Find the range of f with $f(x) = 3 - e^{x(x^2+2x+3)}$ for all $x \in [-1, 0]$.

- $[-1, 0]$
- $[0, 2 + e^{-1}]$
- $[2, 3 - e^{-2}]$
- $(2, 4 + \ln(3))$

Question 4

1 pts

Find the expression of f for which holds:

i. $f'(x) + \ln(2) f(x) = 0\,, \qquad \forall x \in \mathbb{R}.$

ii. $f(0) = 2.$

- ○ $x^2 - 2x + 1$
- ○ e^{5x+1}
- ○ $\ln(x+1)$
- ○ 2^{1-x}

Consider the function f with

$$f(x) = \begin{cases} a\sqrt{4-x} + \frac{x}{4}\,, & x < 0 \\ b\sin(ax) + a + 1\,, & x \geq 0 \end{cases}, \qquad a, b \in \mathbb{R}$$

Find

i. the values of a and b so that the Mean Value Theorem can be applied in the interval $[-5, 1]$.

ii. $\xi \in (-5, 1)$ so that $f'(\xi) = \dfrac{f(1) - f(-5)}{6}$

Question 5

1 pts

i.

- ○ $(a, b) = (-1, 3)$
- ○ $(a, b) = (1, 0)$
- ○ $(a, b) = (2, 1)$
- ○ $(a, b) = (0, 1)$

Question 6

1 pts

ii.

- $-\frac{13}{24}$
- $-\frac{33}{12}$
- $-\frac{44}{25}$
- $-\frac{25}{24}$

Question 7

1 pts

Find the values of the parameters $a, b \in \mathbb{R}$ so that the function $f(x) = \dfrac{2x^2 + a}{bx^2 + 3}$ has one inflection point at $(1, 1)$.

- $(a, b) = \Big\{(4, 1), (-2, 2)\Big\}$
- $(a, b) = \Big\{(2, 1), (3, 2), (-3, 1)\Big\}$

- ○ $(a, b) = (1, 2)$
- ○ $(a, b) = \{(2, 1), (3, 2)\}$

Question 8

1 pts

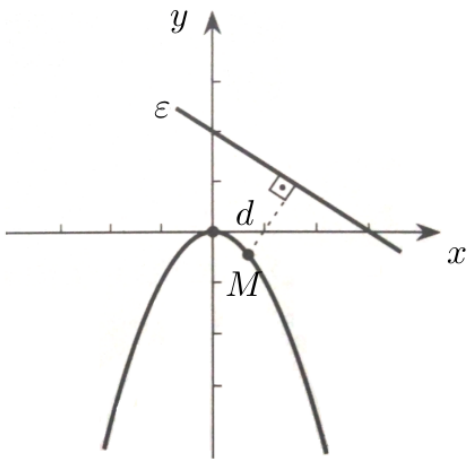
Consider the function f with $f(x) = xe^{-x/a} + b$, $a \neq 0$ and its point $(0, 5)$. The line $y = 7e^{-1} + 5$ is the tagent line of f at a point x_0. Find the vertical and horizontal asymptotes of f.

- ○ Vertical Asymptote : $x = 3$
  Horizontal Asymptote : $y = -5$
- ○ Vertical Asymptote : $\nexists$
  Horizontal Asymptote : $y = 1$
- ○ Vertical Asymptote : $\nexists$
  Horizontal Asymptote : $y = 5$
- ○ Vertical Asymptote : $x = -1$
  Horizontal Asymptote : $\nexists$

Question 9

1 pts

Suppose the quadratic function $y = -x^2$. Find its point that exhibits the sortest distance from the line $(\varepsilon) : \ 3y + 2x - 6 = 0$.



- ○ $M\left(\frac{1}{2}, -\frac{1}{3}\right)$
- ○ $M\left(\frac{2}{3}, -\frac{4}{9}\right)$
- ○ $M\left(\frac{1}{4}, -\frac{1}{16}\right)$
- ○ $M\left(\frac{1}{3}, -\frac{1}{9}\right)$

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