

First Name: _____ Last Name: _____

Student-No: _____ Section: _____

Very short answer questions

1. 2 marks Each part is worth 1 marks. Please write your **simplified** answers in the boxes.

(a) Compute the derivative of $\left(\frac{7x + 2}{x^2 + 3}\right)$

Answer:

(b) Evaluate $\lim_{x \rightarrow \pi/3} \left(\frac{\cos(x) - 1/2}{x - \pi/3}\right)$. Use any method.

Answer:

Short answer questions — you must show your work

2. 4 marks Each part is worth 2 marks.

(a) Find the equation of the line tangent to the graph of $y = \tan(x)$ at $x = \frac{\pi}{4}$.

(b) For what values of x does the derivative of $\frac{x^2 + 6x + 5}{\sin(x)}$ exist? Explain your answer.

Long answer question — you must show your work

3. 4 marks Determine whether the derivative of the following function exists at $x = 0$

$$f(x) = \begin{cases} x^3 - 7x^2 & \text{if } x \leq 0 \\ x^3 \cos\left(\frac{1}{x}\right) & \text{if } x > 0 \end{cases}$$

You must justify your answer using the definition of a derivative.

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Very short answer questions

1. 2 marks Each part is worth 1 marks. Please write your **simplified** answers in the boxes.

(a) Compute the derivative of $\left(\frac{x^2 + 3}{5x + 2}\right)$

Answer:

(b) Evaluate $\lim_{x \rightarrow 2} \left(\frac{x^{2015} - 2^{2015}}{x - 2}\right)$. Use any method.

Answer:

Short answer questions — you must show your work

2. 4 marks Each part is worth 2 marks.

(a) Find the equation of the line tangent to the graph of $y = \cos(x)$ at $x = \frac{\pi}{4}$.

(b) For what values of x does the derivative of $\frac{\sin(x)}{x^2 + 6x + 5}$ exist? Explain your answer.

Long answer question — you must show your work

3. 4 marks Determine whether the derivative of the following function exists at $x = 0$

$$f(x) = \begin{cases} 2x^3 - x^2 & \text{if } x \leq 0 \\ x^2 \sin\left(\frac{1}{x}\right) & \text{if } x > 0 \end{cases}$$

You must justify your answer using the definition of a derivative.

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Very short answer questions

1. 2 marks Each part is worth 1 marks. Please write your **simplified** answers in the boxes.

(a) Compute the derivative of $\left(\frac{3x^2 + 5}{2 - x}\right)$

Answer:

(b) Evaluate $\lim_{y \rightarrow 0} \left(\frac{\sqrt{100180 + y} - \sqrt{100180}}{y} \right)$. Use any method.

Answer:

Short answer questions — you must show your work

2. 4 marks Each part is worth 2 marks.

(a) Find the equation of the line tangent to the graph of $y = x^3$ at $x = \frac{1}{2}$.

(b) For what values of x does the derivative of $e^x \cdot (\sqrt{x} + \sin x)$ exist? Explain your answer.

Long answer question — you must show your work

3. 4 marks Determine whether the derivative of the following function exists at $x = 0$

$$f(x) = \begin{cases} x \cos x & \text{if } x \geq 0 \\ \sqrt{x^2 + x^4} & \text{if } x < 0 \end{cases}$$

You must justify your answer using the definition of a derivative.

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Very short answer questions

1. 2 marks Each part is worth 1 marks. Please write your **simplified** answers in the boxes.

(a) Compute the derivative of $\left(\frac{2-x^2}{3x^2+5}\right)$

Answer:

(b) Evaluate $\lim_{t \rightarrow 4} \left(\frac{\frac{1}{\sqrt{t}} - \frac{1}{2}}{t-4}\right)$. Use any method.

Answer: **Short answer questions — you must show your work**

2. 4 marks Each part is worth 2 marks.

(a) Find the equation of the line tangent to the graph of $y = \sin(x) + \cos(x) + e^x$ at $x = 0$.

(b) For what values of x does the derivative of $\frac{\sqrt{x}}{1-x^2}$ exist? Explain your answer.

Long answer question — you must show your work

3. 4 marks Determine whether the derivative of the following function exists at $x = 0$

$$f(x) = \begin{cases} x \cos x & \text{if } x \leq 0 \\ \sqrt{1+x} - 1 & \text{if } x > 0 \end{cases}$$

You must justify your answer using the definition of a derivative.