



Name:

Student ID:

NUST

Mid Exam

21st January 2023

Time: 2 hours

Mark

/25

Important Instructions

- This Paper consists of **6 questions**. You must have to attempt **ALL** questions.
- The maximum mark for the whole paper is **25**.
- The use of a scientific calculator permitted.
- At the start of the examination, you should have:
 - * This question sheet
 - Rough paper
- Read the task information carefully before you start to write.
- Write your answers in this question Paper.
- If additional space is needed to complete your answer, additional sheets are available at the end of this question book. Clearly write the number of the question that you are answering on this additional paper.
- Diagrams should be drawn with pencil. All other working should be written in blue or black ballpoint. Do not write with pencil.
- If you have any questions at any time during the examination, you must raise your hand and wait for an invigilator. **DO NOT** attempt to communicate, by any means, with any other candidate at any time before or during the examination.





1. If $f(x) = (3x + 8)^{-1}$, find $f'(x)$

.....
[4 marks]

2. Differentiate

(a) Let $f(x) = \sqrt{2x^2 + 2x + 3}$,
find $f'(x)$ and $f'(5)$

.....
[2 marks]

(b) If $f(x) = (x^2 + 5x + 5)^5$, find $f'(x)$ and $f'(-3)$

.....
[2 marks]



3. (a) Expand

i. $y(y - 4)$

.....
[1 mark]

ii. $x(-9x - 8)$

.....
[1 mark]

(b) Factorize

i. $x^2 - 4x - 12$

.....
[1 mark]

ii. $y^2 - 30y + 36$

.....
[1 mark]



4. Integrate by using substitution method

$$\int x^2 \sqrt{11 + x^2} dx$$

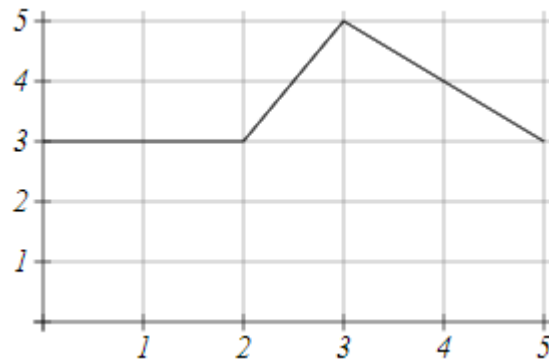
.....
[5 marks]

5. Use the chain rule to find the derivative of $f(x) = 4(9x^5 - 3x^{10})^{16}$

.....
[5 marks]



6. Let $A(x)$ represent the area bounded by the graph, the horizontal axis, and the vertical lines at $x = 1, 2, 3$, and 4 for the graph below. Evaluate $A(x)$ for $x = 1, 2, 3$, and 4



.....
[3 marks]

END OF QUESTIONS





