

**S6MA3ENA – Semestre 1**

**MATHEMATICS 3**

**Part A**

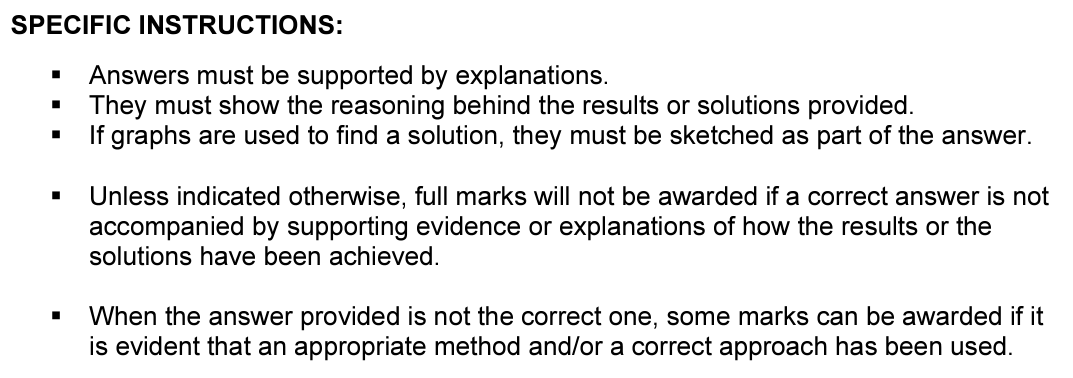
**Date:** Wednesday 15th December 2021

**DURATION OF EXAMINATION:**

1 hour 30 minutes (90 minutes)

**Answer ALL questions**





K. Osborne

|  |  |
| --- | --- |
| **PART A** | **Marks** |
| 1. Give the derivative of the following functions: 2. Consider the graph of the function shown below.   The line r is a tangent line to the graph of at point A.    (a) Use the information in the diagram to find the equation of the line r.  (b) Given that , use the diagram or otherwise to find the value of .   1. A town`s population is growing linearly. In 2018 the population was 5000. By 2020 the population had increased to 7400. 2. Give the function where is the population and is the number of years since 2018. 3. Use your function to predict the population in 2025.      1. According to this model in which year will the population reach 19400? 2. The function is defined as . 3. Determine the coordinates of the y-intercept. 4. Calculate 5. Determine the derivative. 6. For what value of does the function have a turning point? State the nature of the turning point and explain your answer. 7. Find the equation of the tangent to the curve at the point (1,2). 8. The point A is a point on the graph of . The gradient at the point A is equal to 12. Find the coordinates of the point A. 9. The diagram below shows the graph of the function .   The dotted blue lines represent the asymptotes. The graph passes through the point .   1. Give the equation of the vertical asymptote. 2. State the domain of the function. 3. Find value of . 4. Give the equation of the horizontal asymptote. 5. State the range of the function. 6. Find value of . 7. A student says that the value of is 1. Are they correct? You must justify your answer.      1. The graph of the derivative is given below.      1. Give the -coordinates of the two turning points. 2. For which values of is the graph of increasing? 3. For which value of does reach a minimum? 4. Sketch a possible graph of , given that the point lies on the graph of. 5. The graph below is the graph of the function     Which of the 4 graphs below is the corresponding graph of ?  For each graph you **must** explain why it is or is not the correct graph.  B  A      D  C | 2  2  2  4  4  3  2  2  2  2  2  3  4  4  2  2  2  2  2  2  2  2  2  2  3  4 |