First Name: ______________________  Last Name: ______________________
Student-No: ______________________  Section: ______________________

Grade:

The remainder of this page has been left blank for your workings.
Very short answer questions

1. [2 marks] Each part is worth 1 marks. Please write your answers in the boxes.

   (a) Let \( y = \arctan(5x^3) \). Find \( \frac{dy}{dx} \).

   Answer:

(b) A car accelerates from rest at a constant \( 6 \text{ m/s}^2 \). How far has the car traveled when it reaches a velocity of \( 30 \text{ m/s} \)?

   Answer:
Short answer questions — you must show your work

2. [4 marks] Each part is worth 2 marks.
   (a) Find $f'(x)$ if $f(x) = (\cos(x))^{\sqrt{x}}$.

(b) A scientist places 100 bacteria in a petri dish at 12PM. At 2PM, there are 300 bacteria in the petri dish. Assuming the population of bacteria is growing exponentially, how many bacteria do you expect to be in the petri dish at 4PM?
Long answer question — you must show your work

3. 4 marks Consider the curve $e^{xy} = x^5 + y^5$. Find the slope of the line tangent to the curve at the point with $y$-coordinate equal to 0. You must justify your answer.