

ArtSci 1D06 Calculus
Full year 2017–2018
Fall Midterm 1 — Practice version

Instructions There are 5 questions on 4 pages. Answer all the questions in the space provided.
You have 50 minutes. If you need more paper, ask the invigilator.

NAME:

ID NUMBER:

TUTORIAL DAY AND TIME

Problem	Points
1 [6]	
2 [6]	
3 [6]	
4 [6]	
5 [6]	
Total [30]	

1) [6 points] Find the derivatives of the following functions. Do not simplify your answers.

a) $f(x) = \ln(e^{2x} + x)$.

b) $f(x) = \frac{\cos(e^x)}{x + \sin(3x)}$.

c) $f(x) = \arcsin(x^3)$.

2) [6 points] Given $h(x) = f(\sin(x))$, $f(0) = 2$ and $f'(0) = 5$, find $h(\pi)$ and $h'(\pi)$.

3) [6 points]

a) State the Intermediate Value Theorem.

b) Show that there exists a number x which is one greater than its cube.

4) [6 points]

a) State the limit definition of the derivative.

b) Given the function $f(x) = \frac{1}{x-3}$, find its derivative f' from the definition.

5) [6 points]

a) Find the linear approximation $L(x)$ to the function $f(x) = x^3$ at $x = 2$.

b) Use the linear approximation to estimate $(2.001)^3$.

c) With reference to the graph of $y = x^3$, decide if your estimate is an overapproximation or an underapproximation.