

### MA2E01 Tutorial problems #1

(due at the end of your tutorial)

1. Compute the volume of a sphere of radius  $R$  using the method of slicing.
2. Does the straight line through  $A(1, 2, 3)$  and  $B(3, 3, 7)$  pass through  $C(7, 6, 9)$ ?
3. Are the points  $A(1, 0, 2)$ ,  $B(5, 3, 4)$  and  $C(3, -4, 4)$  the vertices of a right triangle?
4. The position of a moving object is given by the vector-valued function

$$\mathbf{r}(t) = \langle t^3 + t, 2 - \ln t, \sin(\pi t) \rangle.$$

- (a) Find the velocity of this object at any given time  $t > 0$ .
- (b) Find the equation of the tangent line to the curve at time  $t = 1$ .
- (c) Does the object move faster when  $t = 1$  or when  $t = 2$ ?