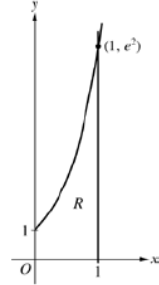


Show all work that leads to your answers!

1.

Let $f(x) = e^{2x}$. Let R be the region in the first quadrant bounded by the graph of $y = f(x)$ and the vertical line $x = 1$, as shown in the figure above.

- Write an equation for the line tangent to the graph of f at $x = 1$.
- Find the area of R .
- Region R forms the base of a solid whose cross sections perpendicular to the y -axis are squares. Write, but do not evaluate, an expression involving one or more integrals that gives the volume of the solid.



2.

Particle X moves along the positive x -axis so that its position at time $t \geq 0$ is given by $x(t) = 5t^3 - 9t^2 + 7$.

- Is particle X moving toward the left or toward the right at time $t = 1$? Give a reason for your answer.
- At what time $t \geq 0$ is particle X farthest to the left? Justify your answer.
- A second particle, Y , moves along the positive y -axis so that its position at time t is given by $y(t) = 7t + 3$. At any time t , $t \geq 0$, the origin and the positions of the particles X and Y are the vertices of a triangle in the first quadrant. Find the rate of change of the area of the triangle at time $t = 1$. Show the work that leads to your answer.

