

Name \_\_\_\_\_

- You have 15 minutes
- No calculators
- Show sufficient work

1. (3 points) Find the average value of the function  $f(x) = 6xe^{x^2}$  on the interval  $[0, 5]$ . Simplify your answer.

2. Let  $\mathbf{R}$  be the finite region bounded by the graphs of  $y = \ln x$ ,  $y = 3$ ,  $y = 5$  and  $x = 0$ . Set up, but do not evaluate, definite integrals which represent the volumes of the following solids.
- (a) (3 points) The volume of the solid with base  $\mathbf{R}$  for which the cross-sections perpendicular to the  $y$ -axis are semi-circles.

(b) The volume of the solid formed when  $\mathbf{R}$  is revolved around the  $y$ -axis. Determine this volume in the following two ways.

i. (2 points) Integrate with respect to  $x$ .

ii. (2 points) Integrate with respect to  $y$ . (Use different integrands in parts  $i$  and  $ii$ .)