1. (2.5 pts) Find the definite integral.

\[ \int_{\sqrt{\pi/2-1}}^{\sqrt{\pi-1}} x \sin(x^2 + 1) \, dx \]

2. (2.5 pts) Find the indefinite integral

\[ \int \frac{(\ln 3x)^2}{x} \, dx \]
3. Consider the region in the first quadrant of the plane bounded by the curves $y = 9x$ and $y = x^3$. In the following manner set up, but do not evaluate, integrals which represent the area of this region.

(a) (2pts) Integrate with respect to $x$.

(b) (2pts) Integrate with respect to $y$.

(c) (1pt) Determine the area of the region by completing any necessary integration.