This test is a closed-book test; you are not allowed to use any calculators. Please write your name below. Be sure to look at all problems before deciding which to do first. Note that some problems are easier than others. You may use the backs of the pages if you need additional space. You have 50 minutes to work.

Be sure to show your work.

Name: ____________________________

Instructor: Amos Ong      M T W F 9:00 AM – 9:50 AM

1. [30 pts] Let $A$ be the region bounded between $y = x^2$, $y = \frac{1}{x}$ and $x = e$.

   (a) Find the area of $A$.
   (b) Use the shell method to find the volume generated by revolving $A$ about the $y$-axis.

2. [30 pts]

   Let $A$ be the region bounded between $y = x$, $y = x^2$, Find the volume generated by revolving $A$ about the $x$-axis.

3. [30 pts] Set up and simplify (but do not evaluate)

   (a) two different integrals (one $dx$ and one $dy$) that give the arc length of the graph of $y = x^{3/2}$ from $(4, 8)$ to $(9, 27)$.
   (b) the integral that gives the surface area by revolving the graph of $y = x^3$ between $x = 16$ and $x = 20$ about the $x$-axis.

4. [60 pts] Evaluate the following indefinite integrals

   (a) $\int x e^{2x} \, dx$          (b) $\int x^2 \ln x \, dx$
   (c) $\int e^x \sin 2x \, dx$      (d) $\int \cos^2(5x) \, dx$
   (e) $\int \cos 2x \sin 5x \, dx$  (f) $\int t^2 e^{t^3} \, dt$