Math 227   Sample Midterm Exam

1. Evaluate $\int \frac{\cos x}{\sin^2 x} \, dx$

2. Evaluate $\int \arctan x \, dx$

3. Evaluate $\int x \ln x \, dx$

4. Evaluate $\int \frac{x+1}{x^2+2x-3} \, dx$

5. Find the volume of the solid obtained by revolving the region bounded by $y = x$ and $y = \sqrt{x}$ about the x-axis. Sketch the region and the solid.

6. Let $\mathcal{R}$ be the region bounded by $y = \frac{\ln x}{x}$, $x = 1$, $x = e$, and $y = 0$. Sketch $\mathcal{R}$ and find the volume of the solid obtained by revolving $\mathcal{R}$ about the y-axis.

7. Evaluate $\int e^{\sqrt{x}} \, dx$
Hint: use two integration techniques successively.

8. Evaluate $\int \sqrt{1 - x^2} \, dx$
by making the trigonometric substitution $x = \cos\theta$.

9. Evaluate $\int_0^\pi \cos^4 x \, dx$

10. Evaluate $\int \frac{1}{x^2+x-2} \, dx$

11. Evaluate $\int \frac{x}{(x-1)^2} \, dx$

12. Evaluate $\frac{d}{dx} \int_0^{\sqrt{x}} e^{-t^2} \, dt$

13. Find the area under the curve $y = \ln x$ between $x = 1$ and $x = e$.