Evaluate the following integrals.

1. $\int \frac{x^2+2}{x^2} dx$

2. $\int \sin^2 3x \cos 3x dx$

3. $\int \frac{1}{x \ln x} dx$

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

5. $\int_{-\pi}^{\pi} \sin^2 x \, dx$

6. $\int xe^{(x^2-1)} dx$

7. A) Write TWO definite integrals (one with respect to x, the other with respect to y) which represent the area, Ω, bound between the graphs of f and g

$f(x) = \sqrt{x}$ $\quad g(x) = \frac{1}{3}x$

B) Find the volume of the solid generated by rotating Ω about the x-axis

C) Determine a definite integral which represents the volume of the solid generated by rotating the area Ω about the y-axis.

8. Find the volume obtained by rotating the region bounded by
$y = \ln x$, $y = 2$, $x = 0$, $y = 0$
about the y-axis

9. Use the shell method to determine the volume obtained by rotating the region bounded by
$f(x) = x^2$, $g(x) = 2x$
about the x-axis

Integration by parts practice:

10. $\int x \cos 3x dx$

11. $\int \frac{\ln x}{x^3} dx$

12. $\int e^x \sin x dx$

Trigonometric Integrals practice:

13. $\int \sin^3 x \cos^2 x \, dx$

14. $\int \cos^2 x \sin 2x \, dx$

15. $\int \tan^3 x \sec x \, dx$