Assignment 1

Make use of trigonometric substitutions to evaluate the following integrals:

1. $\int \frac{1}{a^2 + x^2}\, dx.$
2. $\int \frac{dt}{4 + t^2}$
3. $\int \frac{dy}{\sqrt{9 - y^2}}.$
4. $\int \frac{d\theta}{\sqrt{16 - \theta^2}}.$
5. $\int \frac{dx}{x\sqrt{x^2 - 16}}, \quad (x > 4).$
6. $\int \frac{dy}{y\sqrt{y^2 - 25}}, \quad (y > 5).$
7. $\int \frac{dt}{(t^2 + 9)^{3/2}}.$
8. $\int \frac{dx}{(25 - x^2)^{3/2}}.$
9. $\int \frac{dx}{(x^2 - a^2)^{3/2}}.$
10. $\int \frac{x}{\sqrt{9 - x^2}}\, dx.$
11. $\int \frac{x}{(a^2 - x^2)^{3/2}}\, dx.$
12. $\int \frac{\theta\, d\theta}{\theta^2 + a^2}.$
13. $\int \frac{\theta\, d\theta}{\theta^2 + 3}.$
14. $\int \frac{x\, dx}{x^2 + 5}.$

Evaluate the following integrals:

1. $\int x \ln x\, dx.$
2. $\int x^3 \ln x\, dx.$
3. $\int x^n \ln x\, dx.$
4. $\int \ln (x + 1)\, dx.$
5. $\int \ln x\, dx.$
6. $\int \ln (x^2)\, dx.$
7. $\int xe^x\, dx.$
8. $\int xe^{-x}\, dx.$
9. $\int xe^{mx}\, dx.$
10. $\int \frac{x}{e^{2x}}\, dx.$
11. $\int \mathrm{Cos}^{-1} x\, dx.$
12. $\int \mathrm{Tan}^{-1} x\, dx.$
13. $\int \ln (x^x)\, dx.$
14. $\int x \cos x\, dx.$
15. $\int x \sin 2x\, dx.$
16. $\int (2x + 3) \cos x\, dx.$
17. $\int x^2 \cos 2x\, dx.$
18. $\int x^2 e^x\, dx.$
19. $\int (x + 1)^2 e^{2x}\, dx.$
20. $\int (x^3 - 5x + 7) \sin x\, dx.$