Evaluate the integral using integration by parts with the indicated choices of u and dv.

1) $\int x \ln x \, dx \quad u = \ln x \quad dv = x \, dx$

2) $\int \theta \sec^2 \theta \, d\theta \quad u = \theta \quad dv = \sec^2 \theta \, d\theta$

Evaluate the definite or indefinite integral.

3) $\int xe^{-x} \, dx$

4) $\int x^2 \sin \pi x \, dx$

5) $\int t^3 e^t \, dt$

6) $\int e^{2\theta} \sin 3\theta \, d\theta$

7) $\int \ln(2x+1) \, dx$

8) $\int \sin^{-1} x \, dx$

9) $\int_0^{\pi} t \sin 3t \, dt$

10) $\int_1^2 \frac{\ln x}{x^2} dx$

11) $\int_0^{1/2} \cos^{-1} x \, dx$

12) $\int_0^1 x5^x\,dx$

13) First make a substitution and then use integration by parts to evaluate the integral: $\int_1^4 e^{\sqrt{x}}\,dx$

14) Suppose that $f(1)=2$, $f(4)=7$, $f'(1)=5$, $f'(4)=3$, and f'' is continuous. Find the value of $\int_1^4 x\,f''(x)\,dx$.