Integration by Parts

Evaluate the following integrals.

1. $\int xe^x \, dx.$

2. $\int x \ln x \, dx.$

3. $\int_1^e \ln x \, dx.$

4. $\int_0^1 \arctan x \, dx.$

5. $\int x^2 \cos 2x \, dx.$

6. $\int e^x \cos x \; dx.$

7. $\int \cos \sqrt{x} \; dx.$

8. You are given the following information about an unknown function $g(x)$:

$$\int_1^2 \frac{g(u)}{u} \; du = 3, \int_1^2 g(u) \; du = 4, \int_1^4 g(u) \; du = 5, g(1) = 2, g(2) = -2.$$

(a) Evaluate $\int_1^2 (\ln x) g'(x) \; dx.$

(b) Evaluate $\int_1^2 x g(x^2) \; dx.$

9. $\int \sin 5x \sin 3x \; dx.$