Evaluate the following integrals using integration by parts,
and *check your answers!!*

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

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

3. $\int x \sec^2(x) \, dx$

4. $\int x^2 \cos(2x) \, dx$

5. $\int \ln(x) \, dx$

6. $\int x^3 e^{x^2} \, dx$

7. $\int e^x \cos(x) \, dx$

8. $\int \arctan(x) \, dx$