Name: _____

Integration by Parts

Exercise 1: Find the integral of the following functions (integration by the part):

1) $\int x \ln x dx$

2) $\int x^2 \cos x dx$

3) $\int x e^{-x} dx$

4) $\int e^x \sin x dx$

5) $\int x \sin x dx$

6) $\int x^3 \ln x dx$

7) $\int \sqrt[3]{x} \ln x dx$

8) $\int \arcsin x dx$

9) $\int \cos\left(\sqrt{x}\right) dx$

10) $\int \frac{\ln x}{x^3} dx$

11) $\int e^x \cos x dx$

12) $\int x^3 \sin\left(x^2\right) dx$

13) $\int x^2 e^{3x} dx$

14) $\int x^2 \sin x dx$

15) $\int e^{\sqrt[3]{x}} dx$

16) $\int \frac{e^{\sqrt[3]{x}}}{\sqrt[3]{x}} dx$

17) $\int \sin(\ln x) dx$

18) $\int x e^x dx$

19) $\int x^2 e^x dx$

20) $\int \ln(x) dx$

21) $\int \arctan(x) dx$

22) $\int \cos(2x) e^{3x} dx$

Exercise 2: Prove the following reduction formula:

$$\int x^m (\ln x)^n \, dx = \frac{1}{m+1} x^{m+1} (\ln x)^n - \frac{n}{m+1} \int x^m (\ln x)^{n-1} dx \quad \text{for } m \neq -1.$$