

Math 10560-04
Answers to Integration by Parts

1. $\int \theta \cos(\pi\theta) d\theta$

Answer $\frac{\cos(\pi\theta)}{\pi^2} + \frac{\theta \sin(\pi\theta)}{\pi}$

Take $u = \theta$, $dv = \cos(\pi\theta)$.

2. $\int \tan^{-1} y dy$

Answer $y \tan^{-1}(y) - \frac{\ln(1+y^2)}{2}$.

Take $u = \tan^{-1} y$, $dv = dy$.

Note: If you calculated $\int \sin^{-1} y dy$ you can find this worked out in the notes for §8.1.

3. $\int p^4 e^{-p} dp$

Answer $-(24 + 24p + 12p^2 + 4p^3 + p^4) e^{-p}$

Take $u = p^4$, $dv = e^{-p}$. You have to integrate by parts 4 times, each time taking u to be the power of p .

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

Answer $\frac{1}{16} + \frac{3e^4}{16}$

Take $u = \ln x$, $dv = x^3 dx$. Integration by parts will give you $\frac{x^4 \ln x}{4} - \frac{x^4}{16}$. Now evaluate at the endpoints.