

Review for Quiz on Integration by Parts and Trig. Integrals

Each of the integrals below can be resolved using either (or a combination of) integration by parts, substitution, trig. identities or the special cases described in exploration 14.

For the quiz you should know (memorize) the integrals of the six trig. functions and the following trig. identities:

- $\sin^2 x + \cos^2 x = 1$
- $\tan^2 x + 1 = \sec^2 x$
- $\sin(2x) = 2 \sin x \cos x$
- $\cos^2 x = \frac{1}{2} (1 + \cos 2x)$
- $\sin^2 x = \frac{1}{2} (1 - \cos 2x)$

Problems

Evaluate each of the following integrals without using a calculator. You *must* show your work.

1. $\int 3xe^{2x} dx$

2. $\int \sin^5 y \cos y dy$

3. $\int_1^e 2u \ln u du$

4. $\int_0^{\pi/4} \tan^2 \theta d\theta$

5. $\int 2x \sec 3x \tan 3x dx$

6. $\int \sin^2 x dx$

7. $\int_0^{2\pi} t^2 \sin 2t dt$

8. $\int (\tan^2 x + \tan^4 x) dx$

9. $\int \cot x \cos^2 x dx$

10. $\int \sec^4 \theta \tan \theta d\theta$

Answers

Below are answers to the problems on the reverse side of this page:

1. $\frac{3}{2}e^{2x} \left(x - \frac{1}{2} \right) + C$

2. $\frac{1}{6} \sin^6 y + C$

3. $\frac{1}{2}(1 + e^2)$

4. $1 - \frac{\pi}{4}$

5. $\frac{2}{3}x \sec 3x - \frac{2}{9} \ln |\sec 3x + \tan 3x| + C$

6. $\frac{1}{2}x - \frac{1}{4} \sin 2x + C$

7. $-2\pi^2$

8. $\frac{1}{3} \tan^3 x + C$

9. $\ln |\sin x| - \frac{1}{2} \sin^2 x + C$

10. $\frac{1}{4} \sec^4 \theta + C$