

Homework

Name : _____

Each the following integrals by applying u-substitution and/or trig identities. Pick at least two involving cosine/sine and pick at least two involving tangent/ cosecant. Full solutions available on the course website.

1. Evaluate $\int_0^{\frac{\pi}{2}} \sin^5 x \, dx$.

[Solution] $= \frac{8}{15}$

2. Evaluate $\int \frac{\cos^5 x}{\sin x} \, dx$.

[Solution] $= \ln|\sin x| - \sin^2 x + \frac{1}{4} \sin^4 x + C$

3. Evaluate $\int_0^{\pi} \cos^4 2x \, dx$.

[Solution] $= \frac{3}{8} \pi$

4. Evaluate $\int \sin^3 x \cos^5 x \, dx$.

[Solution]
 $= \frac{1}{4} \sin^4 x - \frac{1}{3} \sin^6 x + \frac{1}{8} \sin^8 x + C$ or $= -\frac{1}{6} \cos^6 x + \frac{1}{8} \cos^8 x + C$

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

[Solution] $= \frac{1}{8} x - \frac{1}{32} \sin 4x + C$

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6. Evaluate $\int \tan^3 x \sec^3 x \, dx$.

Tip: Let $u = \sec x$, then $du = \tan x \sec x \, dx$.

[Solution] $= \frac{1}{5} \sec^5 x - \frac{1}{3} \sec^3 x + C$

7. Evaluate $\int \tan^2 x \sec^4 x \, dx$.

Tip: Let $u = \tan x$, then $du = \sec^2 x \, dx$.

[Solution] $= \frac{1}{5} \tan^5 x + \frac{1}{3} \tan^3 x + C$

8. Evaluate $\int_0^{\pi/4} \sec^4 x \, dx$.

[Solution] $= \frac{4}{3}$

9. Evaluate $\int \frac{1 - \tan^2 x}{1 + \tan^2 x} \, dx$.

[Solution] $= \frac{1}{2} \sin 2x + C$

10. Evaluate $\int \tan^3 x \sec^4 x \, dx$.

[Solution] $= \frac{1}{6} \tan^6 x + \frac{1}{4} \tan^4 x + C$ or $= \frac{1}{6} \sec^6 x - \frac{1}{4} \sec^4 x + C$