

MA114 Summer II 2018
Worksheet 3a – Trig Integrals
6/12/18

1. Compute the following integrals.

a) $\int_0^{\pi/2} \cos^3(x) \, dx,$

b) $\int \frac{\sin(x)}{\cos^3(x)} \, dx,$

c) $\int \sqrt{\cos x} \sin^3(x) \, dx,$

d) $\int_0^{2\pi} \sin^2\left(\frac{1}{3}\theta\right) \, d\theta.$

2. Evaluate $\int \sin x \cos x \, dx$ by four methods:

- a) the substitution $u = \cos x$
- b) the substitution $u = \sin x$
- c) the identity $\sin 2x = 2 \sin x \cos x$
- d) integration by parts.

Explain the different appearances of the answers. How are they related?

3. Consider integrating $\sin^m(x) \cos^n(x)$ with respect to x . When are each of the following strategies useful? (Think about whether m and n are even or odd.)

- a) Save a power of $\cos(x)$, use the Pythagorean identity to convert the others into powers of $\sin(x)$, then substitute $u = \sin(x)$.
- b) Use the half-angle formulas $\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$ and $\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$.
- c) Save a power of $\sin(x)$, use the Pythagorean identity to convert the others into powers of $\cos(x)$, then substitute $u = \cos(x)$.