

MA 114 Worksheet #02: Special Trigonometric Integrals

1. Compute the following integrals:

(a) $\int \sin x \sec^2 x dx$

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

(b) $\int \sin^3 x dx$

(f) $\int_0^{\pi/2} (2 - \sin \theta)^2 d\theta$

(c) $\int_0^{\pi/2} \cos^2(x) dx$

(g) $\int 4 \sin^2 x \cos^2 x dx$

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

(h) $\int \cos^5 x dx.$

2. Find the anti-derivative $\int \cot(x) dx$. Hint: Substitute $u = \sin(x)$.

3. 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.

4. Find the area of the region bounded by the curves $y = \sin^2 x$ and $y = \sin^3 x$ for $0 \leq x \leq \pi$.