

**Math 231/199: Calculus 2 Merit**  
Worksheet 3  
August 30, 2007

- (1) Find  $\int \sin(x) \cos(x) dx$  two different ways.

(2) Find  $\int \cos(x) \sin^2(x) dx$ .

(3) Describe two substitutions you could use to find  $\int \cos^3(x) \sin^{11}(x) dx$ .  
Which would you rather use?

(4) Find  $\int \sin^2(x) \cos^2(x) dx$ . Put your answer in terms of  $\sin(x)$  and  $\cos(x)$ .

(5) Find  $\int \sin^2(x) + \cos^2(x) dx$ .

(6) Find  $\int \tan(x) \sec^2(x) dx$  two different ways.

(7) Are the two answers you got for each of Question 1 and Question 6 the same?

(8) Find  $\int \tan^3(x) dx$ .

(9) Generalize your solution to Question 8 to get a method of finding  $\int \tan^n(x) dx$  where  $n$  is a positive integer.

(10) Find a reduction formula for  $\int \sec^n(x) dx$  where  $n$  is a positive integer.

(11) Describe a method for computing  $\int \tan^m(x) \sec^n(x) dx$  where  $m$  and  $n$  are positive integers and  $m$  is even.

(12) If  $m$  and  $n$  are nonnegative integers, can you now compute  $\int \tan^m(x) \sec^n(x) dx$ ?