Due at the beginning of class on the day of Test 2

Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2414, and the title of the worksheet.Show all work to justify your answer. Answer with insufficient work will receive no credit.

Problem 1: Integrals of the form $\int \sin^m(x)\cos^n(x)dx$

1. $\int \sin^3(x)\cos^4(x)dx$
2. $\int \frac{\cos^3(x)}{\sqrt{\sin(x)}}dx$
3. $\int \cos^2(3x)dx$
4. $\int \sin^3(2x)\sqrt{\cos(2x)}dx$

Problem 2: Integrals of the form $\int \sec^m(x)\tan^n(x)dx$

1. $\int \sec^6(4x)\tan(4x)dx$
2. $\int \tan^3\left(\frac{\pi x}{2}\right)\sec^2\left(\frac{\pi x}{2}\right)dx$

Problem 3: Reduction formula for tangent and secant

1. $\int \sec^3(\pi x)dx$
2. $\int \tan^5\left(\frac{x}{2}\right)dx$

Problem 4: Product to sum formula

1. $\int \cos(5x)\cos(3x)dx$
2. $\int_{\pi/6}^{\pi/3} \sin(6x)\cos(4x)dx$

Problem 5: Some special integrals

Show that the following formulas hold for any positive integers m and n

1. $\int_{-\pi}^{\pi} \sin(mx)\cos(nx)dx = 0$
2. $\int_{-\pi}^{\pi} \sin(mx)\sin(nx)dx = \begin{cases} 0 & \text{if } m \neq n \\ \pi & \text{if } m = n \end{cases}$
3. $\int_{-\pi}^{\pi} \cos(mx)\cos(nx)dx = \begin{cases} 0 & \text{if } m \neq n \\ \pi & \text{if } m = n \end{cases}$