

WORKSHEET 9: TRIGONOMETRIC SUBSTITUTION

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: Substitution $u = a \sin \theta$

Find the integrals

1. $\int \frac{\sqrt{16-x^2}}{x} dx$

2. $\int_0^{\sqrt{3}/2} \frac{x^2}{(1-x^2)^{3/2}} dx$

Problem 2: Substitution $u = a \tan \theta$

1. $\int \frac{1}{(1+x^2)^2} dx$

2. $\int_0^3 \frac{x^3}{\sqrt{x^2+9}} dx$

Problem 3: Substitution $u = a \sec \theta$

1. $\int x^3 \sqrt{x^2-25} dx$

2. $\int_{\sqrt{2}/3}^{2/3} \frac{dx}{x^5 \sqrt{9x^2-1}}$

Problem 4: Completing the square and trig sub

1. $\int \frac{x}{\sqrt{x^2+6x+12}} dx$

2. $\int \sqrt{5+4x-x^2} dx$

Problem 5: An application

Set up the integral to find the area of the shaded region. Evaluate the integral using trig substitution. (Hint: the equation of the circle is $x^2 + y^2 = a^2$, the equation of the chord is $y = h$.)

