

## Pencil and Paper homework Number 4A

This homework has various integral problems. Part I is trig substitutions, and Part II is Partial fractions.

### Part I Trig Substitution

1) Do the following integrals by trig substitution

a)  $\int \sqrt{4-x^2} dx$

b)  $\int_0^2 \sqrt{4-x^2} dx$

c)  $\int_1^2 \sqrt{4-x^2} dx$

d)  $\int \frac{dx}{9+x^2}$

e)  $\int_0^3 \frac{dx}{9+x^2}$

f)  $\int \sqrt{a^2-x^2} dx$

g)  $\int_0^a \sqrt{a^2-x^2} dx$

h)  $\int_0^{a/2} \sqrt{a^2-x^2} dx$

i)  $\int \frac{dx}{\sqrt{4-x^2}}$

j)  $\int_0^2 \frac{dx}{\sqrt{4-x^2}}$  Anything make you uncomfortable?

2) More of the same but harder. Use  $\int \sec^3 x dx = \frac{1}{2} \sec x \tan x + \frac{1}{2} \ln(\sec x + \tan x) + C$

a)  $\int \frac{x^2 dx}{\sqrt{x^2-9}}$  use  $x = 3 \sec \theta$

b)  $\int_4^5 \frac{x^2 dx}{\sqrt{x^2-9}}$  ans = 6.0731

c)  $\int \frac{dx}{\sqrt{25x^2+16}}$

### PartII Partial Fractions

3) Do the following integrals by partial fractions

a)  $\int \frac{2x+41}{x^2-3x-28} dx$

b)  $\int \frac{14x+37}{x^2+7x+10} dx$

c)  $\int \frac{6x^2+23x+16}{x(x+2)^2} dx$

d)  $\int \frac{5x^3+5x^2+10x+5}{(x^2+4)(x^2-1)} dx$  has fractions

e)  $\int \frac{6x^3+34x-5}{(x^2+4)(x^2+9)} dx$

a)  $\int \frac{2x^2+14x+9}{x^2+3x-4} dx$  You must do the division first!!!

4) Find the following integrals in a Table of Integrals and write them down.

a)  $\int \frac{dx}{ax^2+c} dx$        $a, c > 0$

b)  $\int \frac{dx}{ax^2+c} dx$        $a > 0, c < 0$

c)  $\int \frac{dx}{1+\sin(x)} dx$

d)  $\int x\sqrt{ax+b} dx$

e)  $\int \sqrt{(a^2-x^2)^3} dx$

5) Find the following integrals by completing the square and then using a u substitution and an integral table. Each one requires you to look up TWO things in the integral table because it splits into TWO integrals.

a)  $\int \frac{x dx}{x^2+6x+13} dx$       careful of the numerator

b)  $\int \frac{x dx}{\sqrt{8-x^2-2x}} dx$       careful of the numerator