

**First Homework, due July 9th**

1. Use substitution to solve the following integrals:

I)  $\int \frac{\tan^{-1}(x)dx}{1+x^2}$

II)  $\int \frac{x+1}{\sqrt{4-x^2}}dx$

III)  $\int \ln(\cos(x)) \tan(x)dx$

IV)  $\int e^{e^x} e^x dx$

V)  $\int \frac{1+e^x}{1-e^x} dx$

VI)  $\int \frac{\sqrt{x}}{\sqrt{x}+1} dx$  (*hint: suggested substitution:  $x = u^2$* )

2. Use Integration by parts to solve:

I)  $\int e^x \sin(x) dx$

II)  $\int \cos(\ln(x)) dx$

III)  $\int \sin(\sqrt{x}) dx$  (Do a substitution first.)

IV)  $\int (\ln(x))^2 dx$

3. Use Trigonometric Substitution to solve:

I)  $\int \frac{\sqrt{x^2-9}}{x^3} dx$

II)  $\int \frac{dx}{\sqrt{x^2+a^2}}$

$$\text{III) } \int \frac{dx}{(x^2 + 2x + 2)^2}$$

4. Use partial fractions to solve:

$$\text{I) } \int \frac{2x^2 + 2x - 3}{x^4 - 3x^2 - 4} dx$$

$$\text{II) } \int \frac{x^3 - 2x^2 + x + 1}{x^4 + 5x^2 + 4}$$

$$\text{III) } \int \frac{x^2}{(x + 1)^3}$$