

## Integration Review Problems

Evaluate the following integrals

1.  $\int ye^y dy$

Hint: Use integration by parts

2.  $\int \frac{e^y}{(1+e^y)^2} dy$

Hint: Substitute  $u = 1 + e^y$

3.  $\int \frac{x+2}{x-3} dx$

Hint: Write 
$$\frac{x+2}{x-3} = \frac{x-3+5}{x-3}$$
$$= \frac{1}{x-3} + \frac{5}{x-3}$$

4.  $\int \frac{dx}{e^x + e^{-x}}$

Hint: Write  $\int \frac{dx}{e^x + e^{-x}} = \int \frac{e^x dx}{e^{2x} + 1}$  and substitute  $u = e^x$

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

Hint: Integrate using partial fractions

6.  $\int \frac{x}{1+x} dx$

Hint: Similar to one of the above questions

7.  $\int \tan x dx$

Hint: use  $\tan x = \frac{\sin x}{\cos x}$

8.  $\int \sec x dx$

Hint: Write  $\sec x = \sec x \frac{\sec x + \tan x}{\sec x + \tan x}$  (why?)

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

10.  $\int \frac{x-3}{x^2+1} dx$

Hint: Write  $\frac{x-3}{x^2+1} = \frac{x}{x^2+1} - \frac{3}{x^2+1}$

11.  $\int \frac{x+3}{x^2-1} dx$

Hint: Integrate using partial fractions

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

Hint: Integrate using trigonometric substitution

13.  $\int \cos^2 x dx$

Hint: Use half angle formula  $\cos^2 x = \frac{1+\cos 2x}{2}$

14.  $\int \frac{dx}{1+\sin x}$

Hint: Simplify  $\frac{1}{1+\sin x}$  as  $\frac{1}{1+\sin x} = \frac{1}{1+\sin x} \frac{(1-\sin x)}{(1-\sin x)}$