

Math 140, Section 5

Quiz #12

April 12, 2001

SOLUTIONS

1. Find the indefinite integral  $\int \frac{dx}{x^2 + 4x + 4}$ .

*Solution.* We have

$$\int \frac{dx}{x^2 + 4x + 4} = \int \frac{dx}{(x+2)^2} = \int \frac{du}{u^2} = \frac{-1}{u} = \frac{-1}{x+2} + C$$

using the substitution  $u = x + 2$ ,  $du = dx$ .

2. Evaluate the definite integral  $\int_{-1}^1 x + 1 \, dx$ .

*Solution.*

$$\int_{-1}^1 x + 1 \, dx = \frac{x^2}{2} + x \Big|_{-1}^1 = \frac{3}{2} - \left(-\frac{1}{2}\right) = 2$$

3. Find the area  $A$  bounded by the curves  $y = x^2$  and  $y = 2 - x^2$ .

*Solution.* The curves intersect at the points where  $x^2 = 2 - x^2$ , i.e.,  $x = \pm 1$ . Thus we have

$$\begin{aligned} A &= \int_{-1}^1 (2 - x^2) - x^2 \, dx = \int_{-1}^1 2 - 2x^2 \, dx \\ &= 2x - \frac{2}{3}x^3 \Big|_{-1}^1 = \frac{4}{3} - \left(-\frac{4}{3}\right) = \frac{8}{3} \end{aligned}$$