

Math 251/249

Worksheet 14
[More Integration with applications]

1. Evaluate each of the following definite integrals:

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

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

c. $\int \sin^2 \theta d\theta dx$

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

2. Determine the area of the region enclosed by the curves given in each case.

a. $y = \sin \theta$; $x = \frac{\pi}{6}$; $x = \frac{\pi}{3}$; $y = 0$.

b. $y = \sin \theta$; $y = \cos \theta$; $x = 0$; $x = \frac{\pi}{2}$.

c. $y = x^2 - 4x$; $y = x$.

d. $y = x^2 - 4x$; $y = 6 - 3x^2$.

e. $y = e^x$; $y = e^{-x}$; $x = -1$; $x = 1$.

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f. $x = y; \quad x = y^2 - 12.$

g. $x = y^2; \quad x = 2y^2 - y + 3.$

h. $y = (x^2 - 1)^2; \quad y = 1 - x^2.$

i. $y = \frac{4}{x^2}; \quad y = 5 - x^2.$

j. $y = x^3 - 2x^2; \quad y = 2x^2 - 3x.$