

Worksheet 14
[More Integration with applications]

1. Evaluate each of the following definite integrals:

a.
$$\int_1^2 \left(\frac{x}{\sqrt{x^2 + 1}} \right) dx$$

b.
$$\int_1^3 x \sqrt{x^2 + 1} dx$$

c.
$$\int_{\pi/4}^{\pi/3} \sin^2 \theta d\theta dx$$

d.
$$\int_{e^2}^{e^3} \frac{(\ln x)^2}{x} dx$$

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

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

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

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

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

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

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