Faculty of Science
Department of Mathematics and Statistics

Math 251

Worksheet 14
[More Integration with applications]

1.   Evaluate each of the following definite integrals:

a. $\displaystyle\int_{1}^{2\sqrt{2}} \frac{x}{\sqrt{x^2 + 1}} \, dx$

b. $\displaystyle\int_{2\sqrt{2}}^{3} x\sqrt{x^2 + 1} \, dx$

c. $\displaystyle\int_{\pi/6}^{\pi/4} \sin^2 \theta \, d\theta \, dx$

d. $\displaystyle\int_{e^2}^{e^3} \frac{1}{x}(\ln x)^2 \, dx$

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

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

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

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

d. $y = x^2 - 4x; \quad y = 8 - 3x^2.$

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

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

g. $x = y^2;$ $x = 2y^2 - 4y + 3.$

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

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

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