Volumes of Solids of Revolution

54. Calculate the volume of the solid generated by rotating the graph of the function $f(x) = x + \sin x$ about the x-axis over the interval $[0, \pi]$.

55. The region L is bounded by the lines $x = 0$, $y = 5$, and the parabola $y = x^2 + 1$. Compute the volume of the solid obtained by rotating region L about the y-axis.

56. Find the volume of the solid of revolution generated by rotating the region bounded by the curves $xy = 4$, $x = 4$, $x = 1$, and $y = 0$ about the x-axis.

57. Compute the volume of the solid obtained by rotating the region enclosed between the graphs of $f(x) = x^2 + 2x + 2$ and $g(x) = x + 4$ about the x-axis.

Arc Length of a Curve

58. Find the length of the graph of the function $y = \ln\left(\frac{1}{\cos x}\right)$ over the interval $[0, \frac{\pi}{4}]$.

59. Compute the arc length of the curve $f(x) = \frac{e^x + e^{-x}}{2}$ over the interval $[0, 1]$.

60. Find the length of the curve defined by $y^2 = (x-1)^3$ between the points $A(2, -1)$ and $B(5, -8)$.

Surface Area of Solids of Revolution

61. Let C be the part of the graph of the function $y = x^3$ lying between the lines $x = -\frac{2}{3}$ and $x = \frac{2}{3}$. Compute the surface area of the solid generated by rotating the curve C about the x-axis.

62. Calculate the surface area of the solid generated by rotating the graph of $y = \sin x$ about the x-axis between two consecutive zeros.

All above math problems are taken from the following website:
`https://osebje.famnit.upr.si/~penjic/teaching.html`.
The reader can find all solutions to the given problems on the same page.