

Math 1B
Midterm 2 Non-Volume Review

[1] Find the area of the region between $y = 4 - x^2$ and $y = x^2 - 2x$ on $[0, 4]$.

[2] Find the area under the curve $y = \cos^{-1} x$.

[3] Find the length of the curve $y = \frac{1}{8}x^4 + \frac{1}{4x^2}$ on $[1, 2]$.

[4] Find the length of the curve $y = \int_2^x \sqrt{t^2 - 2t} dt$ on $[2, 5]$.

[5] Find the length of the parametric curve
$$\begin{aligned} x &= \frac{9}{4}t^4 - 2t^2 + 5 \\ y &= 4t^3 - 2 \end{aligned}$$
 over $1 \leq t \leq 2$.

[6] Find the length of the parametric curve
$$\begin{aligned} x &= e^{at} \cos bt \\ y &= e^{at} \sin bt \end{aligned}$$
 over $0 \leq t \leq 1$.

[7] A continuous random variable X with mean value 5.4 has probability density function $f(x) = \begin{cases} kx^n, & 0 \leq x \leq 9 \\ 0, & x < 0 \text{ or } x > 9 \end{cases}$

for some constants k and n .

[a] Find k and n .

[b] Find c such that the probability that X is less than c or greater than c are the same.
(This is called the median value of X .)

[8] A solid of revolution has volume $\int_0^\pi 2\pi(y+1)(1-\cos y) dy$. Find the region and the axis of revolution.

Do not use the x - nor y -axes as boundaries nor the axis of revolution.

[9] A solid of revolution has volume $\int_1^4 \pi((3+x)^2 - (3-\sqrt{x})^2) dx$. Find the region and the axis of revolution.

Do not use the x - nor y -axes as boundaries nor the axis of revolution.

[10] Find the centroid of the region bounded by $y = 4x - x^2$ and $y = x - 4$.