

Practice Midterm 1

MATH 9B

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1. Write a lower sum to approximate the area under $y = 4 - x^2$ on the interval $[0, 2]$ with $n = 4$ equal subintervals.
2. You and a companion are driving in a car with a broken odometer; however, the speedometer works. Your friend records the speed at 1 minute intervals for 6 minutes. The table below gives the speeds.

Time (in minutes)	Speed (in miles per hour)
0	25
1	35
2	20
3	40
4	35
5	30
6	60

What is an upper estimate for the distance you and your friend have traveled in that time?

3. Express $\frac{1}{5} + \frac{4}{5} + \frac{9}{5} + \frac{16}{5}$ using sigma notation.
4. Write $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n \sqrt{c_k} \Delta x_k$, where P is a partition of $[1, 9]$, as a definite integral.
5. Find the area under $f(x) = 6 - 5x - x^2$ on the interval $[0, 1]$
6. Find $\frac{d}{dx} \int_0^{x^2} \frac{dt}{1 - \cos t}$
7. Find the average value of $f(x) = 1 - \sin x$ on $[0, \frac{\pi}{2}]$
8. Find the area between $f(y) = \sec^2 y$ and $g(y) = \sin y$ on the interval $[-\frac{\pi}{4}, \frac{\pi}{4}]$.
9. Find the area enclosed by $f(x) = x^3$ and $f(x) = \sqrt[3]{x}$.
10. Evaluate $\int_0^2 x(4 - x^2)^5 dx$
11. Given $\int_0^5 f(x) dx = -5$ and $\int_0^3 f(x) dx = 7$, what is $\int_3^5 -f(x) dx$?

12. Set up the integral to find the volume of the solid given by revolving the region bounded by $y = x^2 - 4x + 2$ and $y = 2$ about the line $y = 2$.
13. Set up the integral to find the volume of the solid given by revolving the region bounded by $y = x$ and $y = 6 - x^2$ about the line $x = -3$.
14. Set up the integral to find the volume of the solid given by revolving the region bounded by $x = y + 1$, $x = 2$ and the x -axis about the y -axis.
15. Find the length of the parametric curve $x = \frac{8\sqrt{t^3}}{3}$, $y = (t - 1)^2$ on the interval $[2, 4]$.
16. Set up the integrals to find the center of mass for the lamina of density 1 given by the region bounded by $y = x^2$ and $y = 2x$.
17. Set up the integral to find the surface area of the sphere of radius 2.
18. Set up the integral to find the work done in stretching a spring 1 foot if a force of 20 pounds is used to stretch the spring half a foot.
19. How much work is done in filling an empty conical tank from a hole in the bottom with oil of weight 60 lb/ft^3 illustrated below.