

Math 10350 – Example Set 16A

1. Evaluate the following integrals:

a. $\int_0^{\pi/4} \sin 4t \, dt$

d. $\int \theta^3 \sec^2(\theta^4 + 1) \, d\theta$

b. $\int_1^2 x^2 e^{x^3+2} \, dx$

e. $\int e^{e^x+x} \, dx$

c. $\int \frac{t+1}{t^2+2t+5} \, dt$

f. $\int_0^{\pi/2} \sin(2\theta + \pi) \cos^3(2\theta + \pi) \, d\theta$

2. Water flows into a large tank at rate $r(t)$ liters/min given in the table below. If the initial volume of water is 100 liters, estimate the volume of water in the tank at $t = 4$ minutes using **left-endpoint** approximation.

t	0	1	2	3	4	5	6
$r(t)$	10	15	18	20	23	21	25

3. Find the **total distance** traveled by a particle with velocity $v(t) = 4t - t^2$ over the time duration $1 \leq t \leq 6$. What is the change in displacement over the same duration?

4. Using **right-endpoint** approximation, estimate the area A under the curve $y = f(x)$ over $[2, 8]$ from the following data for f . Assume that $f(x)$ is positive value.

x	2	3	4	5	6	7	8
$f(x)$	30	35	38	42	44	46	48

Assuming that f is strictly increasing, is the estimate you found a lower or upper estimates for A ?