ACMAT161 Summer 2024
Professor Manguba-Glover
Classwork 21 & 22 Name: _____

Complete as many of the following problems as you can with your table in the allotted time. You do not have to go in order.

Classwork 21

1. Approximate the area bounded by the graph of $f(x) = 3\sqrt{x}$ and the x-axis between $x = 4$ and $x = 16$ with 6 rectangles.
   (a) Using left endpoints
   (b) Using right endpoints
   (c) Are your answers is (a) and (b) overestimates or underestimates?
   (d) Using midpoints
2. Estimate the area under the graph of f on the interval $[0, 2]$ using left and right Riemann sums with $n = 4$, where f is continuous and has values given by the following table:

x	$f(x)$
0	1
0.5	3
1	4.5
1.5	5.5
2	6

3. Evaluate the midpoint Riemann sum for $f(x) = 1 - x^2$ on $[1, 3]$ with $n = 4$ (Note: this function is below the x-axis, so the area will be negative)
4. Evaluate the midpoint Riemann sum for $f(x) = 1 - x^2$ on $[0, 3]$ with $n = 6$ (Note: this function is below the x-axis, so the area will be negative)

Key:

1. (a) ≈ 105.876
   (b) ≈ 117.876
   (c) (a) underestimates, (b) overestimates
   (d) ≈ 112.062
2. 7, 9.5
3. −6.625
4. −3.875

Classwork 22

1. Use geometry to evaluate $\int_2^4 (2x+3)\ dx$
2. Use geometry to evaluate $\int_1^6 (2x-6)\ dx$ (Note: keep in mind negative and positive areas)
3. Assume $\int_0^5 f(x)\ dx = 3$ and $\int_0^7 f(x)\ dx = -10$. Evaluate the following:
   (a) $\int_0^7 2f(x)\ dx$
   (b) $\int_5^7 f(x)\ dx$
   (c) $\int_7^0 f(x)\ dx$
4. Evaluate $\displaystyle\int_0^{10} (60x - 6x^2)\ dx$
5. Evaluate $\displaystyle\int_4^{16} 3\sqrt{x}\ dx$
6. Evaluate $\displaystyle\int_0^{2\pi} 3\sin x\ dx$
7. Evaluate $\displaystyle\int_{1/16}^{1/14} \frac{\sqrt{t}-1}{t}\ dt$

Key:

1. 18
2. 5
3. (a) −20
   (b) −13
   (c) 10
4. 1000
5. 112
6. 0
7. $\frac{1}{2} - \ln 4$