

## Numerical Integration Problems

For each of the following problems, estimate the definite integral using the Trapezoid Rule and Simpson's Rule with the given value of  $n$ .

1.  $\int_0^2 \sqrt{1+x^3} dx \quad n=4$

2.  $\int_0^2 \frac{1}{\sqrt{1+x^3}} dx \quad n=4$

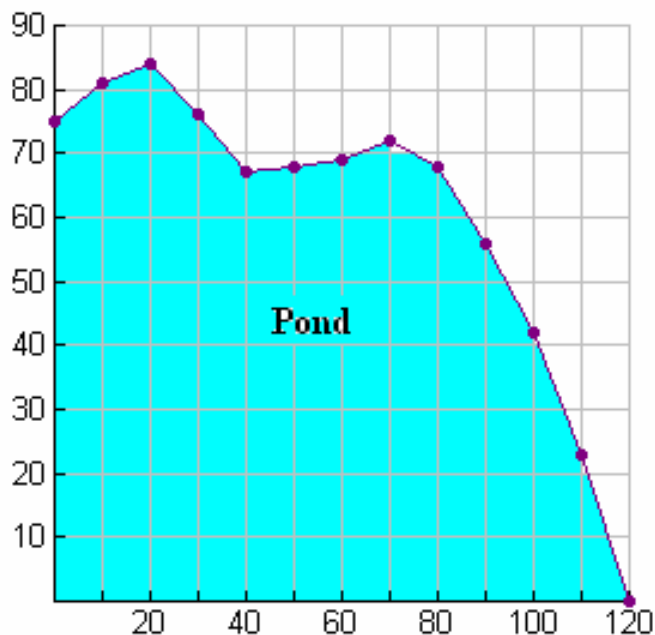
3.  $\int_1^2 \frac{5}{x^2+1} dx \quad n=4$

4.  $\int_0^{\frac{\pi}{2}} \cos(x^2) dx \quad n=6$

5.  $\int_0^4 \sin(\sqrt{x}) dx \quad n=4$

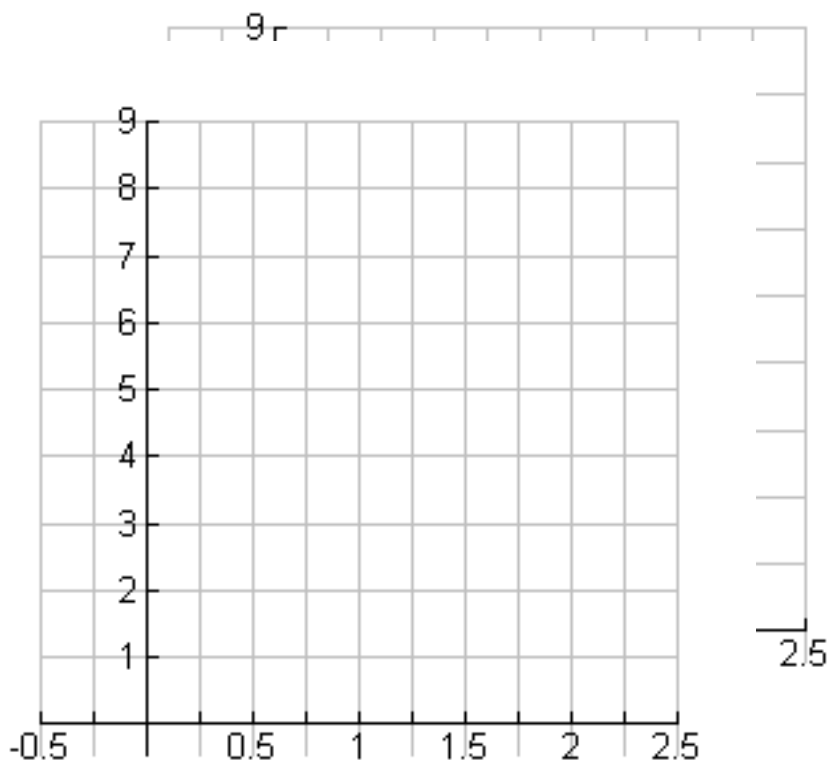
6. To estimate the surface area of a pond, a surveyor takes several measurements, as shown in the table and figure below. Use the Trapezoid and Simpson's Rule to estimate the surface area.

<b>x</b>	0	10	20	30	40	50	60	70	80	90	100	110	120
<b>y</b>	75	81	84	76	67	68	69	72	68	56	42	23	0



7. The table below estimates a continuous function  $f(x)$ . Approximate the integral  $\int_0^2 f(x)dx$  using the Trapezoid and Simpson's Rule.

<b>x</b>	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.0
<b>y</b>	4.32	4.36	4.58	5.79	6.14	7.25	7.64	8.08	8.14



### Answers

- |                      |                      |
|----------------------|----------------------|
| 1. Trap: 3.2832619   | Simpson: 3.239611346 |
| 2. Trap: 1.397336967 | Simpson: 1.397336967 |
| 3. Trap: 1.61761257  | Simpson: 1.608739837 |
| 4. Trap: 0.837709644 | Simpson: 0.850146164 |
| 5. Trap: 3.270912289 | Simpson: 3.399606613 |
| 6. Trap: 7435        | Simpson: 7463.333    |
| 7. Trap: 12.5175     | Simpson: 12.5917     |