AP Calculus
Worksheet 4-5
Mr. James

Name ___________________

Numerical Integration Methods

For 1–3, use (a) the Trapezoid Rule and (b) the Midpoint Rule to approximate the definite integral for the stated value of *n*. Use approximations to four decimal places for $f(x_i)$ and round off final answers to three decimal places. Compare your results to the exact evaluation for the definite integral.

1. $\displaystyle\int_1^4 \frac{1}{x}\,dx, \quad n = 6$

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

3. $\displaystyle\int_{\pi/4}^{\pi/2} \frac{\sin x}{x}\,dx, \quad n = 4$

For 4–5, the data in the tables below were obtained experimentally, where *x* and *y* are physical variables. Assuming that $y = f(x)$ where *f* is continuous, approximate the definite integral $\int f(x)dx$ on [2, 4] by means of (a) the Trapezoid Rule and (b) the Midpoint Rule.

4.

x	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
y	4.12	3.76	3.21	3.58	3.94	4.15	4.69	5.44	7.52

5.

x	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0
y	12.1	11.4	9.7	8.4	6.3	6.2	5.8	5.4	5.1	5.9	5.6

6. The graph at right is an electronic spectrogram (idealized) of the radiant energy produced by the star γ Leonis (temp = 7500K). The *x*-axis is in arbitrary wavelength units and the *y*-axis is in arbitrary intensity units. Use the Trapezoid Rule to calculate how much energy γ Leonis produces compared to the sun (= 36.3 on this scale). [*To facilitate your analysis, make a table by reading values of y off the graph. Then apply the trapezoid rule.*]