# 5-1

1. (REVIEW)

   (a) Find the most general antiderivative of $f(x) = \sqrt{2} - e^x + 4\cos x$.

   (b) Find $g(x)$ if $g'(x) = \sqrt{2} - e^x + 4\cos x$ and $g(\pi) = 1$.

   (c) If $g'(x)$ represented velocity, what is $g(x)$? What would $g(0)$ mean? $g(2)$?

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2. Goal of this next part is to estimate the area under the curve $y = \frac{1}{2}x^2 + 1$ and above the $x$-axis on the interval $[0, 2]$.

   (a) (strategy 1) right-hand endpoints, n=4 rectangles

(b) (strategy 2) left-hand endpoints, n=4 rectangles

(c) (strategy 3) midpoints, n=4 rectangles

(d) (strategy 3.1) midpoints, n=10 rectangles

3. Suppose the odometer on our car is broken and we want to estimate the distance driven over a 1.5 hour time period. We take speedometer readings every 15 minutes and then record them in the table below. Estimate the distance traveled by the car. What method are you using?

| Time (minutes) | 0 | 15 | 30 | 45 | 60 | 75 | 90 |
|---|---|---|---|---|---|---|---|
| Velocity (mi/h) | 17 | 21 | 24 | 29 | 32 | 31 | 28 |

4. Oil leaked out of a tank at a rate of $r(t)$ liters per hour. The rate decreased as time passed and values of the rate at 2 hour time intervals are shown in the table. Estimate how much oil leaked out. What method are you using? Is it an overestimate or an underestimate.

| t (h) | 0 | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|---|
| r(t) (L/h) | 8.7 | 7.6 | 6.8 | 6.2 | 5.7 | 5.3 |