Review Problems 2

1. The rates of escape of pollutant are given in the following table:

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate (gal./day)</td>
<td>15</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

(a) Estimate the total amount of pollutant escaped using the right hand Riemann sum.

(b) It is known that the rate is decreasing. Is your estimate in (a) an overestimate or an underestimate? Explain.

(c) Estimate the error in (a).

2. #18, Ch. 5 Review.

3. #19, Ch. 5 Review.

4. The velocity of a particle moving along $x$-axis at the time $t$ (in sec.) is $v(t) = t^2 + t - 2$ (in meter/sec.).

(a) If at time $t = 0$, the particle is at the origin, determine the position of the particle at time $t = 2$. (You should be able to do this both by using calculator and by using the fundamental theorem of calculus.)

(b) What is the total distance traveled by the particle from $t = 0$ to $t = 2$?

5. Compute $\int_{-3}^{2} |x - 1| \, dx$.

(a) Interpreting it as area.

(b) Using the fundamental theorem of calculus.

6. Let $F(x)$ be an antiderivative of $f(x)$.

(a) If the units $x$ and $f(x)$ are gallons and pounds respectively, what are the units of $F(x)$.

(b) Suppose that you know that $F(0) = 1$, $\int_{-1}^{1} f(x) \, dx = 1$, and $f$ is an even function. Determine $F(1)$.

7. Using the fundamental theorem of calculus, find the area of region bounded by $y = x^2 - 2$ from below and by $y = 6 - x^2$ from above.

8. Using the fundamental theorem of calculus, find the average value of $f(x) = \cos x$ for $x$ in $[0, \pi]$.

9. #47, Ch. 6 Review.

10. #49, Ch. 6 Review.