2. [18 points] The graph of the function \( f(x) \), shown below, consists of line segments and a semicircle. Compute each of the following quantities.

![Graph of f(x)](image)

**a. [7 points]**

1. \( \int_{0}^{2} f(x) \, dx = \)

2. \( \int_{-2}^{2} |f(x)| \, dx = \)

3. \( \int_{0}^{5} f(x) \, dx = \)

4. \( \int_{-2}^{2} 2f(x) \, dx + \int_{5}^{2} 3f(x) \, dx = \)

5. The average \( A \) of \( f(x) \) on the interval \([-2, 5]\). \( A = \)

6. \( \int_{0}^{1} f(5x) \, dx = \)
b. [4 points]

If $f(x)$ is the derivative of a function $g(x)$ with $g(2) = 1$, fill in the table of values of $g(x)$, provided below, at the specified points (the graph has been reproduced for your convenience):

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g(x)$</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


c. [5 points] Graph $g(x)$. Make sure your graph indicates the intervals on which $g(x)$ is increasing, decreasing, concave up, and concave down.

d. [2 points] Let $h(x) = \int_{0}^{x} f(t)dt$. Find a constant $C$ such that $g(x) = h(x) + C$. Show all your work.