• Complete all questions.
• You may not use electronic calculation devices during this examination.
• Show all work for full credit.
• You have 50 minutes to complete the exam.

1. Suppose \( g(x) = \int_x^{x^2} \sin(t^2) \, dt \). Find \( g'(x) \).

2. Evaluate
\[
\int_0^3 2x + \sqrt{9-x^2} \, dx
\]
by interpreting it in terms of area.

3. A table of values of an increasing function \( f \) is shown. Using the table, give the best possible lower and upper estimates for
\[
\int_1^{10} f(x) \, dx.
\]

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>0</td>
<td>7.9</td>
<td>9.4</td>
<td>12.1</td>
<td>21.1</td>
<td>27.7</td>
<td>28.4</td>
<td>32.7</td>
<td>42.1</td>
</tr>
</tbody>
</table>

4. Suppose \( g''(x) = 6x - 4, g'(0) = 1, \) and \( g(1) = -1 \). Find \( g(x) \).
5. Write the following difference as a single integral of the form \( \int_a^b f(x) \, dx \).
\[
\int_2^{10} f(x) \, dx - \int_6^{10} f(x) \, dx
\]

6. Evaluate the integrals.
   
   (a) \( \int (1 - t)(2 - t) \, dt \)

   (b) \( \int_1^5 |4 - 2x| \, dx \)

7. Evaluate the integrals.
   
   (a) \( \int 5x \sin(x^2 + 3) \, dx \)

   (b) \( \int x^2 (1 + \sqrt{x}) \, dx \)

8. Evaluate the integrals.
   
   (a) \( \int \frac{2}{(1 + 3t)^2} \, dt \).

   (b) \( \int x \sqrt{3x - 2} \, dx \).