6. [10 points] Consider an infinitely differentiable function \( f(x) \). The following table gives some values of \( f(x) \) and its derivatives at \( x = 1 \):

<table>
<thead>
<tr>
<th>( f(1) )</th>
<th>( f'(1) )</th>
<th>( f''(1) )</th>
<th>( f'''(1) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \pi/4 )</td>
<td>1/2</td>
<td>-1/4</td>
<td>2</td>
</tr>
</tbody>
</table>

a. [4 points] Write down \( P_3(x) \), the third-degree Taylor polynomial of \( f(x) \) about \( x = 1 \). You do not need to simplify.

\[
P_3(x) = \]

b. [3 points] Recall that \( f(x) \approx P_3(x) \) near \( x = 1 \). Use this and the fact that \( f(1.5) = \pi/3 \) to write an approximation for \( \pi \). You do not need to simplify your answer. Your answer should not contain the symbol \( \pi \).

\[
\pi \approx \]

c. [3 points]
Use the Taylor polynomial from part a. to approximate the definite integral

\[
\int_1^{1.1} f(x) \, dx.
\]

You do not need to simplify your answer.

Answer: 

\[
\]