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

$f(1)$	$f'(1)$	$f''(1)$	$f'''(1)$
$\pi/4$	$1/2$	$-1/4$	2

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.

$$P_3(x) = \underline{\hspace{4in}}$$

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 π. You do not need to simplify your answer. Your answer should not contain the symbol π.

$$\pi \approx \underline{\hspace{4in}}$$

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

$$\int_1^{1.1} f(x)\, \mathrm{d}x.$$

You do not need to simplify your answer.

Answer: $\underline{\hspace{4in}}$