1. (5 pts)
Use the graph of $P'(t)$ at right to work the following problems.

(a) If $P(1) = 2$, then:

\[
\begin{align*}
P(0) &= 3 \\
P(4) &= 1 \\
P(5) &= 2
\end{align*}
\]

(b) Make a sketch of $P$ on the same graph as $P'(t)$, being sure to include the points you found in (a).

2. (5 pts) The 5th/3rd Bank’s Nunavut Bond is guaranteed to pay $90 + 9t$ dollars per year for 9 years, where $t$ is in years from the present. Should you buy the bond today if it is being sold for $909 dollars? Assume an interest rate of 5%, compounded continuously.

Justify your answer. (You may use your calculator to approximate the value of any definite integral(s), but you must write down the integral you have approximated.)

We need to compare the present value of the bond to the present value of your cash ($909). The former is given by the equation

\[
PV_b = \int_0^9 (90 + 9t)e^{-0.05t} \, dt \approx $924.
\]

A precise answer can be computed using integration-by-parts. Since $909 < 924$, it is a good deal to buy the bond. (You make an “instant” profit of $15, or a future profit of $15e^{0.05(9)}$.)

Note: you can also compare the future value of the two “investments:”

\[
FV_b = PV_b = 924e^{0.05(9)} \quad FV_c = PV_c = 909e^{0.05(9)}
\]

You cannot, however, mix present and future values in your comparison.