

4. [9 points] Let $P(v) = \begin{cases} v^2 \sin\left(\frac{1}{v}\right) - v \sin(2) & \text{if } v \neq 0 \\ 0 & \text{if } v = 0. \end{cases}$

a. [5 points]

Use the limit definition of the derivative to write down an explicit expression for $P'(0)$.
Your answer should not include the letter P .

Do not attempt to evaluate or simplify the limit.

$$P'(0) =$$

b. [4 points] Use your answer to (a) to estimate $P'(0)$ to the nearest hundredth.

Be sure to include enough clear graphical or numerical evidence to justify your answer.

Answer: $P'(0) \approx$ _____