1. [10 points] Some values of the invertible, differentiable function $G(t)$ are shown in the table below, along with some values of $G'(t)$, the **derivative** of $G(t)$.

t	0	1	2	3	4	5	6
$G(t)$	0	2	5	7	8	10	11
$G'(t)$	0	5	1	2	1	3	0

For parts **a.** – **d.**, find the **exact** numerical values, or write DNE if the value does not exist. Your answers should not include the letter G, but you do not need to simply. *Show your work.*

a. [2 points] Let $P(t) = t^3 G(t)$. Find $P'(2)$.

Solution: $P'(t) = 3t^2 G(t) + t^3 G'(t)$, so

$$P'(2) \;=\; 3\cdot 2^2 G(2) + 2^3 G'(2) \;=\; 12\cdot 5 + 8\cdot 1 \;=\; 68.$$

Answer: $P'(2) =$ 68

b. [2 points] Let $A(t) = \dfrac{G(3t+2)}{2t+1}$. Find $A'(1)$.

Solution: $A'(t) = \dfrac{3G'(3t+2)(2t+1) - 2G(3t+2)}{(2t+1)^2}$, so

$$A'(1) \;=\; \frac{3G'(5)\cdot 3 - 2G(5)}{3^2} \;=\; \frac{27-20}{9} \;=\; \frac{7}{9}.$$

Answer: $A'(1) =$ 7/9

c. [2 points] Let $K(t) = G^{-1}(t)$. Find $K'(2)$.

Solution: $K'(2) \;=\; \dfrac{1}{G'\big(G^{-1}(2)\big)} \;=\; \dfrac{1}{G'(1)} \;=\; \dfrac{1}{5}.$

Answer: $K'(2) =$ 1/5

d. [2 points] Let $R(t) = \ln(G(t))$. Find $R'(5)$.

Solution: $R'(t) = \frac{1}{G(t)} \cdot G'(t)$, so $R'(5) \;=\; \dfrac{1}{G(5)} \cdot G'(5) \;=\; \dfrac{3}{10}.$

Answer: $R'(5) =$ 3/10

e. [2 points] Gabby the gopher is furiously digging an underground tunnel. Suppose $G(t)$ gives the length in meters of Gabby's tunnel t hours after she started digging at 6am.

Fill in the blank with a number to give a practical interpretation of the fact that $G'(5) = 3$.

Solution: The interval from 10:55 to 11:05 is ten minutes, which is one-sixth of an hour, so we need to divide $G'(5)$ by 6.

Gabby's tunnel was about 1/2 *meters longer at 11:05am than it was at 10:55am.*