

13. (10 pts) In the late 1970's, complex political pressures caused the price of refined gold to rise sharply. Let t be the time in years since 1900, and let H be the worldwide gold holdings (the total amount of gold worldwide), in *tons*. At $t = 79$, the world economy held 26,000 tons of gold. This quantity was steadily growing at approximately 500 tons per year.

Also, let P be the market price of gold in *millions of dollars per ton*. For times near 1979, the price P of gold was approximately:

$$P = 9.9 + 11(t - 79)$$

a) (2 pts) How fast was the price of gold rising in 1979?

$$P'(79) = 11 \quad (\text{units} = \text{millions of } \$/\text{ton per year})$$

b) (2 pts) Let V be the dollar value of all the gold in the world. Calculate V in 1979. Include units in your answer.

$$\begin{aligned} V(79) &= H(79) \cdot P(79) = 26,000 \cdot 9.9 \\ &= \$ 257,400 \text{ million.} \end{aligned}$$

c) (6 pts) How fast was V changing in 1979? Answer in a meaningful sentence, with units.

$$\text{We are told } H'(79) = 500 \text{ tons/year}$$

Using the ~~chain~~ ^{product} rule:

$$\begin{aligned} V'(79) &= H'(79) \cdot P(79) \\ &\quad + H(79) \cdot P'(79) \end{aligned}$$

$$= 500 \cdot 9.9 + 26,000 \cdot 11$$

$$= 4950 + 286,000$$

$$= 290,950$$

$$(\text{units} = \text{millions of } \$ \text{ per year})$$