4. [8 points] A new cryptocurrency ExpCoin was created to have its value grow exponentially over time. The value, in dollars, of one ExpCoin t years after ExpCoin was invented is given by

$$V(t) = 900(3)^{2t-2}.$$

Fill in the blanks below with correct numbers given in **exact form**.

a. [2 points]

One ExpCoin was worth \$_____100_____ when ExpCoin was invented.

b. [2 points]
The **yearly growth factor** of ExpCoin is _____9_____.

c. [4 points]
The value of one ExpCoin grows by _____$100(9^{1/365} - 1)$_____ % per **day**.
Note that this problem is about the **daily** not yearly growth rate. Assume for this problem that there are 365 days in one year.

Solution: Note that the daily growth factor is $9^{1/365}$, hence the result above.

5. [10 points] At Rowena's trading card store, she sells regular cards and foil cards. All the cards are rated on their rarity R which is a number between 0 and 15. A regular card of rarity R costs $h(R)$ dollars, while a foil card of rarity R costs $f(R)$ dollars. Suppose both $h(R)$ and $f(R)$ have inverse functions.

a. [3 points] Give a practical interpretation of the expression $h^{-1}(12)$.

Solution: $h^{-1}(12)$ is the rarity of a card worth \$12.

b. [3 points]
Write an equation, possibly involving the functions h and f, that expresses the following: "A regular card of rarity 7 costs \$100 more than twice the cost of a foil card of rarity 3."

Solution: $h(7) = 100 + 2f(3)$

c. [4 points]
Give a practical interpretation of the equation $h(f^{-1}(729)) = 180$.

Solution: A regular card, with the same rarity of a foil card that costs \$729, costs \$180.
or:
A foil card worth \$729 would be worth \$180 if it was a regular card.

