Name

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

(Round your final answers only. Round monetary answers to the nearest cent, round time answers to the nearest tenth of a year, and round percentage answers to the nearest hundredth of a percent.)

1. A new truck is purchased for $22,000 and is predicted to depreciate in value by 25% each year.
   a. At that rate, when will the truck be worth half of its original value? $\boxed{\text{2.4 years}}$

$$A(t) = P \cdot (1-r)^t$$
$$\tfrac{1}{2}P = P \cdot (0.75)^t \Rightarrow \tfrac{1}{2} = (0.75)^t$$
$$\log(0.5) = \log(0.75)^t \Rightarrow \log(0.5) = t \cdot \log(0.75)$$
$$t = \frac{\log(0.5)}{\log(0.75)} = 2.4$$

   b. In reality, the truck is traded in two years later for $11,000. At what rate per year did it actually depreciate? $\boxed{29.29\%}$

$$A(t) = P \cdot (1-r)^t$$
$$11000 = 22000 \cdot (1-r)^2 \Rightarrow \tfrac{1}{2} = (1-r)^2$$
$$\sqrt{\tfrac{1}{2}} = \sqrt{(1-r)^2} \Rightarrow \sqrt{\tfrac{1}{2}} = 1-r$$
$$r = 1 - \sqrt{\tfrac{1}{2}} = 0.2929 = 29.29\%$$

2. A local credit union offers a 5-year CD at 6% APR compounded monthly and a local bank offers a 5-year CD at 5.9% APR compounded continuously.
   What is the effective rate for the credit union CD? $\boxed{6.17\%}$
   BONUS: What is the effective rate for the bank CD? $\boxed{6.08\%}$

Credit union: $r_e = \left(1 + \tfrac{r}{m}\right)^m - 1 = \left(1 + \tfrac{0.06}{12}\right)^{12} - 1 = (1.005)^{12} - 1 = 0.0617 = 6.17\%$

Bank: $r_e = e^r - 1 = e^{0.059} - 1 = 0.0608 = 6.08\%$