BECA/Huson/Algebra 2: Regents Preparation Name:
20 June 2024

Prep #32 - Business and Financial Mathematics

1. Julia deposits \$2000 into a savings account that earns 4% interest per year. The exponential function that models this savings account is $y = 2000(1.04)^t$, where t is the time in years. Which equation correctly represents the amount of money in her savings account in terms of the monthly growth rate?

   (a) $y = 166.67(1.04)^{0.12t}$

   (b) $y = 2000(1.01)^t$

   (c) $y = 2000(1.0032737)^{12t}$

   (d) $y = 166.67(1.0032737)^{12t}$

2. Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach. The formula to compute a mortgage payment, M, is $M = P \cdot \dfrac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

   With no down payment, determine Jim's mortgage payment, rounded to the nearest dollar.

   Algebraically determine and state the down payment, rounded to the *nearest dollar*, that Jim needs to make in order for his mortgage payment to be \$1100.

3. An equation to represent the value of a car after t months of ownership is $v = 32,000(0.81)^{\frac{t}{12}}$. Which statement is *not* correct?

   (a) The car lost approximately 19% of its value each month.

   (b) The car maintained approximately 98% of its value each month.

   (c) The value of the car when it was purchased was \$32,000.

   (d) The value of the car 1 year after it was purchased was \$25,920.

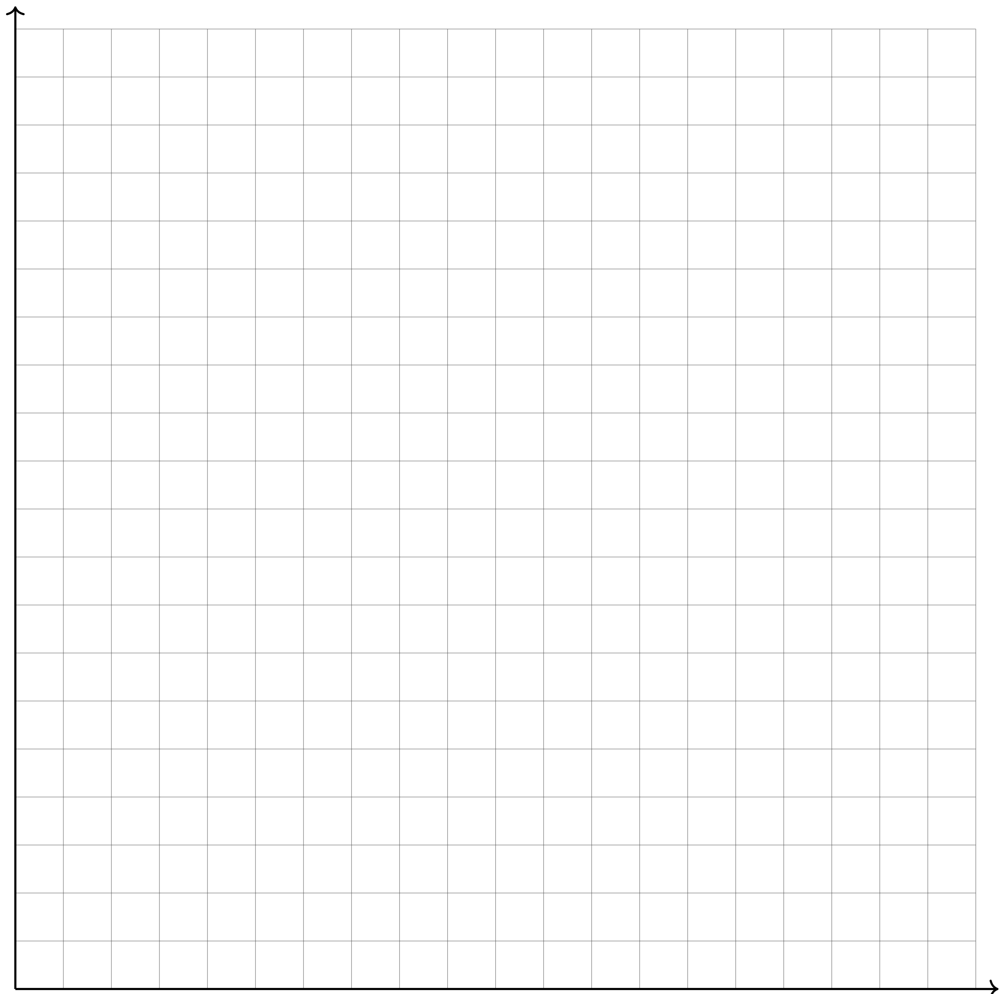
4. The function below models the average price of gas in a small town since January 1st.

   $$G(t) = -0.0049t^4 + 0.0923t^3 - 0.56t^2 + 1.166t + 3.23, \text{ where } 0 \le t \le 10.$$

   If $G(t)$ is the average price of gas in dollars and t represents the number of months since January 1st, the absolute maximum $G(t)$ reaches over the given domain is about what value, to the nearest cent?

5. The value of a certain small passenger car based on its use in years is modeled by $V(t) = 28482.698(0.684)^t$, where $V(t)$ is the value in dollars and t is the time in years. Zach had to take out a loan to purchase the small passenger car. The function $Z(t) = 22151.327(0.778)^t$, where $Z(t)$ is measured in dollars, and t is the time in years, models the unpaid amount of Zach's loan over time.

   Graph $V(t)$ and $Z(t)$ over the interval $0 \leq t \leq 5$, on the set of axes below.



   State when $V(t) = Z(t)$, to the *nearest hundredth*, and interpret its meaning in the context of the problem.