

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Math 110

**Quiz 2 – Exponential Functions**

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**Show all work for full credit!!! Round all answers to 2 decimal places.**

1. **(8 pts)** To save for a child's college education, parents deposit \$10,000 one time into an account that pays 3.15% annual interest compounded daily.
  - a. What will the value of the investment be in 18 years?
  - b. How much interest will be earned in 18 years?
  - c. How long will it take for the investment to reach \$15,000?
2. **(3 pts)** What interest rate will allow \$6000 to grow to \$10,000 in 8 years if interest is compounded quarterly?

3. **(13 pts)** Suppose that a stock's price is rising at the rate of 6% per year, and that it continues to increase at this rate. Right now, one share of this stock is \$126.
- Write an equation that represents the value of the stock, where  $t$  represents years.
  - Estimate the value of one share of the stock in 3 years.
  - When will one share of the stock be worth \$200?
  - Sketch a graph. Find the horizontal asymptote,  $x$ -intercept, and  $y$ -intercept.

4. **(8 pts)** \$5,000 is placed into an account that earns 2.75% interest continuously compounded.
- How much will be in the account after 10 years?
  - How much interest is earned in those 10 years?
  - How long will it take for the investment to double?
5. **(4 pts)** How much money must be initially deposited into an account with 3.4% interest compounded monthly if you want to have \$12,000 in 5 years?
6. **(2 pts)** The average rent for a one-bedroom apartment in Providence can be modeled by  $R(t) = 2240(1.049)^t$ , where  $R(t)$  is the rent in dollars and  $t = 0$  represents the year 2023.
- What was the average rent in 2023?
  - Is the rent increasing or decreasing? By what percentage?

7. (12 pts) A company's total cost, in millions of dollars, can be modeled by  $C(x) = -20e^{-0.18t} + 110$ , where  $t$  is the time in years since the start-up date.

a. Sketch a graph. Find the horizontal asymptote,  $x$ -intercept, and  $y$ -intercept.

b. Interpret the meaning of the  $y$ -intercept.

c. Interpret the meaning of the horizontal asymptote.

d. When will the company's total cost be at \$100 million?

**\*\*BONUS (5 pts) \*\***

Given the supply function  $p = 20(1.1)^{\frac{q}{10}}$  and the demand function  $p = 50(0.95)^{\frac{q}{10}}$ , find the equilibrium point.