

8 May 2018

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Homework: Pretest exponential functions

1. A bank account earns interest at a continuous interest rate of 4% per year. The initial deposit is \$175.

(a) Express the balance in the account as a function in the form $P(t) = P_0 \cdot e^{rt}$

(b) Convert the function to one without a coefficient in the exponent.

(c) What is the interest rate expressed as a simple, annual rate?

2. Judith puts \$2500 into an investment account with interest compounded continuously. If the annual interest rate is 2.15% what is the balance after 20 years?

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

$$G(t) = 0.0812t^3 - 0.75t^2 + 1.25t + 3.23, \text{ where } 0 \leq t \leq 5.$$

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? (graph the function in your calculator and use the Max function)

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4. Write $\sqrt[3]{x^5}$ as a single term with a rational exponent.
5. Write $\sqrt{a^4} \div a^{\frac{1}{2}}$ as an expression with positive, integer exponents.
6. If $n = \sqrt{z^3}$ and $m = z$, where $a > 0$, express $\frac{n}{m}$ as
 - (a) a radical with positive, integer exponents
 - (b) an expression with a fractional exponent
7. What is the expression $2i^3(-3i + 7)$ equivalent to? Express your answer in the form $a + bi$, where $a, b \in \mathbb{R}$.
8. Simplify the expression $(1x - 3i)^2$, where i is the imaginary unit. Express your answer in the form $a + bi$, where $a, b \in \mathbb{R}$.
9. Algebraically determine the values of h and k to correctly complete the identity stated below.

$$3x^3 - 7x^2 + 5x - 5 = (x - 2)(3x^2 + hx + k)$$

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10. The expression $(x + a)(x + b)$ can not be written as

(a) $a(x + b) + x(x + b)$

(b) $x^2 + (a - b)x + ab$

(c) $x^2 + (a + b)x + ab$

(d) $x(x + a) + b(x + a)$

11. What is the quotient and the remainder when $3x^3 + 8x^2 + 7x + 3$ is divided by $x + 2$?

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12. Judith puts \$1000 into an investment account with interest compounded continuously. What is the approximate annual rate is needed for the account to grow to \$1529.59 after 10 years?
13. The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010.
 - (a) Initially, as of 2010, what is the population in millions.
 - (b) What is the rate that the population increases continuously, per year?
 - (c) Express the population as a function with the form $p(t) = Ab^t$, where A and b are real numbers.
14. For a given time, x , in seconds, an electric current, y , can be represented by $y = 2.7^{-.10x}$.
 - (a) Simplify the expression to eliminate the coefficient in the exponent.
 - (b) Is the electric current increasing or decreasing? Justify your answer.
 - (c) Is the current in the original equation, above, exponential growth or decay? Why?

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15. Iridium-192 is an isotope of iridium and has a half-life of 73.83 days. If a laboratory experiment begins with 100 grams of Iridium-192, the number of grams, A , of Iridium-192 present after t days would be

$$A = 100 \left(\frac{1}{2} \right)^{\frac{t}{73.83}}$$

- (a) Simplify the equation to eliminate the fraction in the exponent.
- (b) After one day, how much isotope is present?
- (c) As a percentage, how much does the mass of the isotope change each day?