A2.A.12: Evaluating Exponential Expressions: Evaluate exponential expressions, including those with base e

1 The height, f(x), of a bouncing ball after x bounces is represented by $f(x) = 80(0.5)^x$. How many times higher is the first bounce than the fourth bounce?
1) 8
2) 2
3) 16
4) 4

2 A population, p(x), of wild turkeys in a certain area is represented by the function $p(x) = 17(1.15)^{2x}$, where x is the number of years since 2010. How many more turkeys will be in the population for the year 2015 than 2010?
1) 46
2) 49
3) 51
4) 68

3 If \$5000 is invested at a rate of 3% interest compounded quarterly, what is the value of the investment in 5 years? (Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A is the amount accrued, P is the principal, r is the interest rate, n is the number of times per year the money is compounded, and t is the length of time, in years.)
1) \$5190.33
2) \$5796.37
3) \$5805.92
4) \$5808.08

4 Yusef deposits \$50 into a savings account that pays 3.25% interest compounded quarterly. The amount, A, in his account can be determined by the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where P is the initial amount invested, r is the interest rate, n is the number of times per year the money is compounded, and t is the number of years for which the money is invested. What will his investment be worth in 12 years if he makes no other deposits or withdrawals?
1) \$55.10
2) \$73.73
3) \$232.11
4) \$619.74

5 The Franklins inherited \$3,500, which they want to invest for their child's future college expenses. If they invest it at 8.25% with interest compounded monthly, determine the value of the account, in dollars, after 5 years. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A = value of the investment after t years, P = principal invested, r = annual interest rate, and n = number of times compounded per year.

6 The formula to determine continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time, in years. Which equation could be used to determine the value of an account with an \$18,000 initial investment, at an interest rate of 1.25% for 24 months?

1) $A = 18{,}000e^{1.25 \cdot 2}$
2) $A = 18{,}000e^{1.25 \cdot 24}$
3) $A = 18{,}000e^{0.0125 \cdot 2}$
4) $A = 18{,}000e^{0.0125 \cdot 24}$

7 The amount of money in an account can be determined by the formula $A = Pe^{rt}$, where P is the initial investment, r is the annual interest rate, and t is the number of years the money was invested. What is the value of a \$5000 investment after 18 years, if it was invested at 4% interest compounded continuously?

1) \$9367.30
2) \$9869.39
3) \$10,129.08
4) \$10,272.17

8 Evaluate $e^{x \ln y}$ when $x = 3$ and $y = 2$.

9 The formula for continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time in years. Using the formula, determine, to the *nearest dollar*, the amount in the account after 8 years if \$750 is invested at an annual rate of 3%.

10 Matt places \$1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $V = Pe^{rt}$, where V is the value of the account in t years, P is the principal initially invested, e is the base of a natural logarithm, and r is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.

11 A population of wolves in a county is represented by the equation $P(t) = 80(0.98)^t$, where t is the number of years since 1998. Predict the number of wolves in the population in the year 2008.

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Answer Section

1 ANS: 1 REF: 060607b

2 ANS: 3

$p(5) - p(0) = 17(1.15)^{2(5)} - 17(1.15)^{2(0)} \approx 68.8 - 17 \approx 51$

REF: 061527a2

3 ANS: 3

$5000\left(1 + \frac{.03}{4}\right)^{4 \cdot 5} = 5000(1.0075)^{20} \approx 5805.92$

REF: 011410a2

4 ANS: 2

$A = 50\left(1 + \frac{.0325}{4}\right)^{4 \cdot 12} = 50(1.008125)^{48} \approx 73.73$

REF: 081511a2

5 ANS:
$5,279.61

REF: 080224b

6 ANS: 3 REF: 060416a2

7 ANS: 4

$A = 5000e^{(.04)(18)} \approx 10272.17$

REF: 011607a2

8 ANS:

$e^{3\ln 2} = e^{\ln 2^3} = e^{\ln 8} = 8$

REF: 061131a2

9 ANS:

$A = 750e^{(0.03)(8)} \approx 953$

REF: 061229a2

10 ANS:
2,298.65

REF: fall0932a2

11 ANS:
65

REF: 060721b