EXAM 3 REVIEW

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the compound interest formulas $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve.

1) Suppose that you have $8000 to invest. Which investment yields the greater return over 6 years: 6.25% compounded continuously or 6.3% compounded semiannually? 1) _____

A) $8000 invested at 6.3% compounded semiannually over 6 years yields the greater return.
B) Both investment plans yield the same return.
C) $8000 invested at 6.25% compounded continuously over 6 years yields the greater return.

2) Find the accumulated value of an investment of $1710 at 6% compounded annually for 12 years. 2) _____

A) $3440.86 B) $3246.09 C) $2941.20 D) $2838.60

Write the equation in its equivalent exponential form.

3) $\log_5 125 = 3$ 3) _____

A) $5^{125} = 3$ B) $125^3 = 5$ C) $5^3 = 125$ D) $3^5 = 125$

4) $\log_2 16 = x$ 4) _____

A) $x^2 = 16$ B) $2^x = 16$ C) $16^x = 2$ D) $16^2 = x$

Write the equation in its equivalent logarithmic form.

5) $6^3 = 216$ 5) _____

A) $\log_3 216 = 6$ B) $\log_{216} 6 = 3$
C) $\log_6 216 = 3$ D) $\log_6 3 = 216$

6) $\sqrt[3]{125} = 5$ 6) _____

A) $\log_{125} 3 = \frac{1}{5}$ B) $\log_5 125 = \frac{1}{3}$ C) $\log_{125} 5 = \frac{1}{3}$ D) $\log_5 125 = 3$

Find the domain of the logarithmic function.

7) $f(x) = \ln (8 - x)$ 7) _____

A) $(-\infty, 8)$ or $(8, \infty)$ B) $(-8, \infty)$ C) $(-\infty, 0)$ D) $(-\infty, 8)$

8) $f(x) = \log\left(\frac{x + 5}{x - 2}\right)$ 8) _____

A) $(2, \infty)$ B) $(-\infty, -5) \cup (2, \infty)$
C) $(-5, 2)$ D) $(-\infty, -5)$

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

9) $\log_5\left(\frac{7 \cdot 11}{13}\right)$ 9) _____

A) $\log_5 77 - \log_5 13$

B) $\log_5 5$

C) $\log_5 7 + \log_5 11 - \log_5 13$

D) $\log_5 (\frac{77}{13})$

10) $\log_5\left(\frac{\sqrt[4]{x}\ \sqrt[3]{y}}{z^2}\right)$ 10) _____

A) $4\log_5 x + 3\log_5 y - 2\log_5 z$

B) $\frac{1}{4}\log_5 x \cdot \frac{1}{3}\log_5 y \div 2\log_5 z$

C) $\frac{4}{5}\log_5 x + \frac{3}{5}\log_5 y - \frac{2}{5}\log_5 z$

D) $\frac{1}{4}\log_5 x + \frac{1}{3}\log_5 y - 2\log_5 z$

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

11) $\frac{1}{2}(\log_5 (r - 4) - \log_5 r)$ 11) _____

A) $\log_5 \sqrt{\frac{r - 4}{2r}}$

B) $\log_5 \frac{\sqrt{r - 4}}{r}$

C) $\log_5 \sqrt{\frac{r - 4}{r}}$

D) $\log_5 \frac{r - 4}{\sqrt{r}}$

Solve the exponential equation. Express the solution set in terms of natural logarithms.

12) $4^{x + 7} = 5$ 12) _____

A) $\left\{\frac{\ln 4}{\ln 5} + \ln 7\right\}$

B) $\left\{\frac{\ln 5}{\ln 4} - 7\right\}$

C) $\{\ln 5 - \ln 4 - \ln 7\}$

D) $\left\{\frac{\ln 4}{\ln 5} + 7\right\}$

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

13) $e^{2x} + e^x - 6 = 0$ 13) _____

A) 0.69, 1.10

B) 0.14

C) 1.10, 0.14

D) 0.69

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

14) $\ln \sqrt{x + 1} = 8$ 14) _____

A) $\{e^{16} + 1\}$

B) $\left\{\frac{e^8}{2} + 1\right\}$

C) $\{e^{16} - 1\}$

D) $\{e^8 - 1\}$

Solve the problem.

15) Find out how long it takes a $3300 investment to double if it is invested at 9% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 15) _____

A) 8.2 years B) 7.8 years C) 8 years D) 7.6 years

16) The population of a certain country is growing at a rate of 2.7% per year. How long will it take for this country's population to double? Use the formula $t = \frac{\ln 2}{k}$, which gives the time, t, for a population with growth rate k, to double. (Round to the nearest whole year.) 16) _____

A) 28 years B) 25 years C) 27 years D) 26 years

Solve.

17) A fossilized leaf contains 13% of its normal amount of carbon 14. How old is the fossil (to the nearest year)? Use 5600 years as the half-life of carbon 14. 17) _____

A) 36,015 B) 20,685 C) 1123 D) 16,453

18) An endangered species of fish has a population that is decreasing exponentially ($A = A_0e^{kt}$). The population 5 years ago was 1800. Today, only 800 of the fish are alive. Once the population drops below 100, the situation will be irreversible. When will this happen, according to the model? (Round to the nearest whole year.) 18) _____

A) 13 years from today B) 14 years from today
C) 15 years from today D) 12 years from today

Solve the problem.

19) The logistic growth function $f(t) = \frac{640}{1 + 5.4e^{-0.2t}}$ describes the population of a species of butterflies t months after they are introduced to a non-threatening habitat. How many butterflies were initially introduced to the habitat? 19) _____

A) 2 butterflies B) 640 butterflies C) 100 butterflies D) 5 butterflies

Use Newton's Law of Cooling, $T = C + (T_0 - C)e^{kt}$, to solve the problem

20) A lasagna removed from the oven has a temperature of 430°F. It is left sitting in a room that has a temperature of 65°F. After 7 minutes, the temperature of the lasagna is 300°F. Use Newton's Law of Cooling to find a model for the temperature of the lasagna, T, after t minutes. 20) _____

A) $T = 65 + 365e^{-0.0699t}$ B) $T = 65 + 365e^{-0.0629t}$
C) $T = 65 + 235e^{-0.0699t}$ D) $T = 300 + 365e^{-0.0629t}$

Rewrite the equation in terms of base e. Express the answer in terms of a natural logarithm, and then round to three decimal places.

21) $y = 1.7(0.7)^x$ 21) _____

A) $y = 0.7e^{x \ln 1.7}$, $y = 0.7e^{0.531x}$ B) $y = 1.7e^{x \ln 0.7}$, $y = 1.7e^{-0.357x}$
C) $y = 1.7e^{0.7x}$, $y = 1.72.718^{-0.357x}$ D) $y = (\ln 1.7)e^{x \ln 0.7}$, $y = 0.531e^{-0.357x}$

Use Newton's Law of Cooling, $T = C + (T_0 - C)e^{kt}$, to solve the problem

22) A tub of ice cream initially has a temperature of 25°F. It is left to thaw in a room that has a temperature of 72°F. After 10 minutes, the temperature of the ice cream has risen to 33°F. After how many minutes will the temperature of the ice cream be 54°F? 22) _____

A) 51 min B) 55 min C) 63 min D) 47 min