**Honors Algebra 3-4**
Chapter 3 Pre-Quiz Review

Name Key

Period ______

#1. Complete the table to determine the amount of money P that should be invested at r = 8% compounded continuously to produce a final balance of $200,000 in t years. (round to nearest dollar)

| t | 1 | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|
| P | $184623 | $89866 | $40379 | $18144 | $8152 | $3663 |

$A = Pe^{rt}$

$200000 = Pe^{.08t}$ $\quad P = \frac{200000}{e^{.08t}}$ (put in calc Y1=, use table listing)

#2. Complete the table to determine the amount of money P that should be invested at r = 10% compounded monthly to produce a final balance of $200,000 in t years. (round to nearest dollar)

| t | 1 | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|
| P | $181042 | $73881 | $27292 | $10082 | $3724 | $1376 |

$A = P\left(1+\frac{r}{n}\right)^{nt}$ $\quad n = 12$

$200000 = P\left(1+\frac{.10}{12}\right)^{12t}$ $\quad P = \frac{200000}{\left(1+\frac{.10}{12}\right)^{12t}}$ (put in calc Y1 =, use table listing)

#3. Write the exponential equation in logarithmic form: $4^3 = 64$ $\quad \log_4 64 = 3$

#4. Evaluate the expression without using a calculator: $\log_6 216$

$\log_6 216 = x$

$6^x = 216$ $\quad 6 \cdot 6 \cdot 6 = 216$

$\boxed{x = 3}$

#5. Evaluate the logarithm using the change of base formula (round to 3 decimal places): $\log_{12} 200$

$\log_{12} 200 = \frac{\ln 200}{\ln 12} = \boxed{2.132}$

#6. Rewrite the expression as a sum, difference, and/or multiple of logarithms: $\log_{10} \frac{5\sqrt{y}}{x^2}$

$\log_{10} 5\sqrt{y} - \log_{10} x^2$

$\log_{10} 5 + \log_{10} \sqrt{y} - \log_{10} x^2$ $\rightarrow$ $\log_{10} 5 + \log_{10} y^{1/2} - \log_{10} x^2$

$\boxed{\log_{10} 5 + \frac{1}{2}\log_{10} y - 2\log_{10} x}$

#7. Write the expression as the logarithm of a single quantity: $3\left[\ln x - 2\ln\left(x^2+1\right)\right] + 2\ln 5$

$3\ln x - 6\ln(x^2+1) + 2\ln 5$

$\ln x^3 - \ln(x^2+1)^6 + \ln 5^2$

$\ln x^3 - \ln(x^2+1)^6 + \ln 25$

$\boxed{\ln\left(\frac{25x^3}{(x^2+1)^6}\right)}$

#8. Solve for x: $8^x = 512$

$8^x = 512$

$8 \cdot 8 \cdot 8 = 512$ —or— $\log_8(8^x) = \log_8 512$

$\boxed{x = 3}$

$x = \log_8 512 = \frac{\ln 512}{\ln 8} = \boxed{3}$

#9. Solve for x: $\log_7 x = 4$

write in exponential form: $7^4 = x$

$x = \boxed{2401}$

#10. The population of a town is modeled by $P = 12{,}620\, e^{0.0118t}$ where t = 0 represents the year 2000. According to this model, when will the population reach 17,000?

$17000 = 12620 e^{.0118t}$

$\frac{17000}{12620} = e^{.0118t}$

$\ln\left(\frac{17000}{12620}\right) = \ln\left(e^{.0118t}\right)$

$\ln\left(\frac{17000}{12620}\right) = .0118t$

$t = \frac{\ln\left(\frac{17000}{12620}\right)}{.0118}$

$t = 25.2 + 2000$

$\boxed{2025}$

#11. A deposit of $10,000 is made in a savings account for which the interest is compounded continuously. The balance will double in 12 years.

$A = Pe^{rt}$

| t | A |
|---|---|
| 0 | P (10000) |
| 12 | 2P (20000) |

$20000 = 10000 e^{r12}$

$\frac{20000}{10000} = e^{12r}$

$2 = e^{12r}$

$\ln 2 = 12r$

$r = \frac{\ln 2}{12}$

$r = .05776$

(a) What is the annual interest rate for this account?

$\boxed{r = 5.78\%}$

(b) Find the balance after 1 year.

$A = 10000\, e^{.0578(1)} = \boxed{\$10595.03}$

(c) The effective yield of a savings plan is the percent increase in the balance after 1 year. Find the effective yield.

$10595.03 − $10000 = $595.03 gain

$\frac{595.03}{10000} = .0595$ $\boxed{5.95\%}$

Answers:

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#2.

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#3. $\log_4 64 = 3$ #4. 3 #5. 2.132 #6. $\log_{10} 5 + \frac{1}{2}\log_{10} y - 2\log_{10} x$

#7. $\ln\left(\frac{25x^3}{\left(x^2+1\right)^6}\right)$ #8. 3 #9. 2401 #10. in 2025

#11. (a) 5.78% (b) $10595.03 (c) 5.95%

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|---|---|---|---|---|---|---|
| **P** | | | | | | |

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|---|---|---|---|---|---|---|
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(b) Find the balance after 1 year.

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