Practice Test / Unit 6 **Secondary 3 Honors**

Non-Calculator

Simplify. Round any decimal answers to 3 decimal places.

1. $\ln e^{5x+1}$

$e^{?} = e^{5x+1}$

$= \boxed{5x+1}$

2. $6^{\log_6 23} = ?$

$\log_6 ? = \log_6 23$

$= \boxed{23}$

3. $\log_8 8^{x^5+4}$

$8^{?} = 8^{x^5+4}$

$= \boxed{x^5+4}$

4. $e^{\ln(x+3)} = ?$

$\ln ? = \ln(x+3)$

$= \boxed{x+3}$

5. $\frac{6x^{-3}y^4}{(3xy^2)^{-2}}$

$= \frac{6x^{-3}y^4}{3^{-2}x^{-2}y^{-4}}$

$= \frac{6 \cdot 3^2 x^2 y^4 y^4}{x^3} = \boxed{\frac{54y^8}{x}}$

6. $\log_4 64$

$4^{?} = 64$

$= \boxed{64}$

7. Condense the following. $2\log x - 3\log y + \log z$

$= \log x^2 - \log y^3 + \log z$

$= \boxed{\log\left(\frac{x^2 z}{y^3}\right)}$

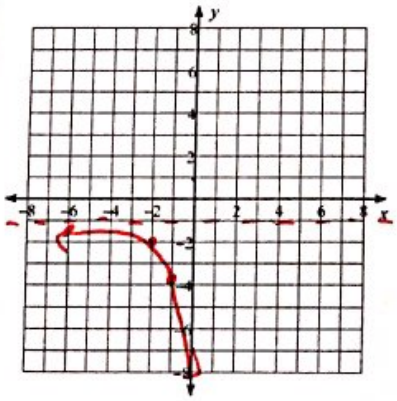
8. Expand. $\log_3(3x^2\sqrt{y})$

$= \log_3 3 + \log_3 x^2 + \log_3 y^{1/2}$

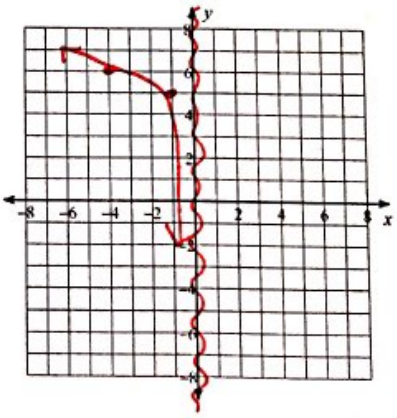
$= \boxed{1 + 2\log_3 x + \frac{1}{2}\log_3 y}$

Graph. Make sure to show two points and the asymptote.

9. $f(x) = -e^{x+2} - 1$



10. $f(x) = \log_3(-x) + 5$



11. If $\log_x 5 = 0.898$ and $\log_x 9 = 1.226$, find $\log_x\left(\frac{5}{3}\right)$.

$\log_x\left(\frac{5}{3}\right) = \log_x 5 - \log_x 3$

$= \log_x 5 - \log_x 9^{1/2}$

$= \log_x 5 - \frac{1}{2}\log_x 9 = .898 - \frac{1}{2}(1.226) = \boxed{.285}$

CALCULATOR.

Solve. Round any decimal answers to 3 decimal places.

12. $6e^{3x} + 2 = 6$

$6e^{3x} = 4$

$e^{3x} = \frac{2}{3}$

$\ln\left(\frac{2}{3}\right) = 3x$

$\frac{\ln(2/3)}{3} = x$

$\boxed{x \approx -.135}$

13. $2(6)^{5x} - 3 = 10$

$2(6)^{5x} = 13$

$(6)^{5x} = 13/2$

$\log_6(13/2) = 5x$

$\frac{\log_6(13/2)}{5} = x$

$\boxed{x \approx .209}$

14. $5^{x^2} \cdot 5^{-x} \cdot 5^{-4} = 25$

$5^{x^2-x-4} = 5^2$

$x^2 - x - 4 = 2$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$\boxed{x = 3,\ x = -2}$

15. $x^{\frac{3}{4}} = 8$

$\sqrt[4]{x^3} = 8$

$\sqrt[4]{x} = \sqrt[3]{8}$

$(\sqrt[4]{x})^4 = (2)^4$

$\boxed{x = 16}$

16. $\ln(x) - \ln(2) = 8$

$\ln\left(\frac{x}{2}\right) = 8$

$e^8 = \frac{x}{2}$

$2e^8 = x$

$\boxed{x \approx 5961.916}$

17. $\log(2x+3) + \log(3) = \log(7)$

$\log(6x+9) = \log(7)$

$6x + 9 = 7$

$6x = -2$

$\boxed{x = -1/3}$

18. Determine the amount of time for an investment to triple if the investment is compounded continuously at 3%. Round to 2 decimal places.

If triple $\rightarrow \frac{A}{P} = 3$

$A = Pe^{rt}$

$\frac{A}{P} = e^{rt}$

$3 = e^{.03t}$

$\ln 3 = .03t$

$\frac{\ln 3}{.03} = t$

$\boxed{t = 36.62 \text{ years}}$

19. The half-life of radioactive technetium is 213,000 years.

a. Use the formula $y = Ce^{kt}$ to solve for k. Round to **8 decimal places.**

If half life $\frac{y}{C} = \frac{1}{2}$

$\frac{y}{C} = e^{kt}$

$\frac{1}{2} = e^{k(213,000)}$

$\ln \frac{1}{2} = 213,000\,k$ → $k = \frac{\ln \frac{1}{2}}{213,000}$

$k = -.00000325$

b. If you begin with 30 grams of radioactive technetium, write the specific equation for the model.

$y = 30e^{-.00000325t}$

c. using your equation from (b), how much will remain after 75,000 years?

$y = 30e^{-.00000325(75,000)} =$ 23.51 grams

20. Find $\lim_{x\to\infty} \frac{300}{1+2e^{-0.36t}}$

* Use calc to plug in bigger and bigger X-values

X	y
10	284.46
100	300
1000	300
⋮	⋮

$= 300$