

Quiz #3

Name:

1. Use the Laws of Logarithms to rewrite (i.e. expand) the expression without logarithms of products, quotients, powers or roots

$$\log \frac{x^2 \sqrt{x+1}}{x^2+1}$$

$$\log \frac{x^2 \sqrt{x+1}}{x^2+1}$$

$$= \log x^2 + \log \sqrt{x+1} - \log(x^2 + 1)$$

$$= 2 \log x + \log(x+1)^{\frac{1}{2}} - \log(x^2 + 1)$$

$$= 2 \log x + \frac{1}{2} \log(x+1) - \log(x^2 + 1)$$

2. Write as a single logarithm:

$$\ln(x+1) + 3 \ln x - \frac{1}{2} \ln(x^2+3)$$

$$\ln(x+1) + 3 \ln x - \frac{1}{2} \ln(x^2+3)$$

$$= \ln(x+1) + \ln x^3 - \ln(x^2+3)^{\frac{1}{2}}$$

$$= \ln(x+1) + \ln x^3 - \ln \sqrt{x^2+3}$$

$$= \ln \frac{(x+1)x^3}{\sqrt{x^2+3}}$$

3. The initial size of a culture of bacteria is 500. After one hour the bacterium count is 750. Find a function that models the population after t hours. (You do not need to simplify the function.)

$$N(t) = 500e^{rt}$$

Since $N(1) = 750$,

$$750 = 500e^{r \cdot 1}$$

Dividing each side by 500,

$$\frac{750}{500} = e^r$$

$$1.5 = e^r$$

Taking the logarithmic form,

$$r = \ln 1.5$$

Plugging this back this back in, we get

$$N(t) = 500e^{(\ln 1.5)t}$$

You may simplify and write:

$$N(t) = 500(1.5)^t$$