

Name: *key*

Date:

Period:

M3 2.1, 2.2 Review

Rewrite the following expressions in exponential form, then find the value of  $y$ .

(1)  $\log_5 25 = y$

$$5^y = 25$$

$$y = 2$$

(2)  $\log_3 1 = y$

$$3^y = 1$$

$$y = 0$$

(3)  $\log_{16} 4 = y$

$$16^y = 4$$

$$y = 1/2$$

(4)  $\log_5 1 = y$

$$5^y = 1$$

$$y = 0$$

(5)  $\log_2 8 = y$

$$2^y = 8$$

$$y = 3$$

(6)  $\log_7 \frac{1}{7} = y$

$$7^y = 1/7$$

$$y = -1$$

(7)  $\log_2 \frac{1}{8} = y$

$$2^y = 1/8$$

$$y = -3$$

(8)  $\log_3 \frac{1}{9} = y$

$$3^y = 1/9$$

$$y = -2$$

(9)  $\log_y 32 = 5$

$$y^5 = 32$$

$$y = 2$$

(10)  $\log_9 y = -\frac{1}{2}$

$$9^{-1/2} = y$$

$$y = 1/3$$

(11)  $\log_4 \frac{1}{8} = y$

$$4^y = 1/8$$

$$y = -3/2$$

(12)  $\log_9 \frac{1}{y} = -2$

$$9^{-2} = 1/y$$

$$y = 81$$

Federal student loan interest rates for the 2022-2023 school year are 4.99%. When compounded daily, what is the effective annual interest rate?

Say you take out a loan of \$1

After one year, you owe  $1 \cdot \left(1 + \frac{0.0499}{365}\right)^{365} = 1.0512$

Subtract your starting amt,

$$1.0512 - 1 = 0.0512$$

divide by starting amt

$$0.0512 \div 1 = 0.0512$$

turn into a percentage!  $0.0512 \rightarrow 5.12\%$

In 2021-2022, the federal student loan interest rate was 3.73%. When compounded daily, what is the effective annual interest rate? How much did the effective annual interest rate increase from 2021-2022 to 2022-2023?

$$1 \cdot \left(1 + \frac{0.0373}{365}\right)^{365} = 1.038$$

$$1.038 - 1 = 0.038$$

$$0.038 \div 1 = 0.038 \rightarrow 3.8\%$$

effective annual rate changed from 3.8% to 5.12%  
(went up by 1.32%)

In-state tuition at UMass Amherst is \$17,364 per year. Alice takes out a loan to pay for all four years of her undergraduate education. After she graduates, her loan begins to collect interest at an annual rate of 4.99%, compounded daily. Alice doesn't pay off her loan at all for the first five years after graduation. How much will she owe then?

$$\text{Total loan amt} = 17364 \cdot 4 = 69456$$

$$69456 \left(1 + \frac{0.0499}{365}\right)^{365 \cdot 5} = \$89,137.17$$