Math 11 Quiz Chapter 5 Winter 2019 Name Last_____ First KEY
21 points out of 20 possible

Use good test-taking strategy: If you get stuck – go on to do another problem that you can do. Then later return to the problems you find more difficult - if you still have time.
You can use x or t as the variable in any of these questions – either is fine with me.

1. [*2 points*] **Re-express in logarithmic form. (Rewrite using log with an appropriate base.)**

a. $\sqrt[3]{e} = 1.3956$ $\ln(1.3956) = \frac{1}{3}$

$7^5 = 16807$ $\log_7(16807) = 5$

2. [*2 points*] $y = 4500\,(0.62)^t$ **Re-express the function in the form $y = ae^{kt}$**
Show work. In the equation, round k to 3 decimal places.

$b = .62 = e^k$ $k = \ln(.62) = -.478$

ANSWER: $y = 4500e^{-.478t}$

3. [*3 points*] A new cooking/recipe website has 6,400 users now.
The number of users follows an exponential growth model.
The number of users is projected to grow to be 20,000 people at the end of 3 years.

Find *b* and write the exponential growth function $y = ab^x$. *Round b to 4 decimal places.*

You must show algebra work using the appropriate method/ strategy covered in class to solve this.
Trial and error, guess and check, table of values, or otherwise substituting numbers into "find" the solution are not acceptable.

$a = 6400$ $y = 20000$ when $x = 3$ $y = ab^x$

$20000 = 6400b^3$

$\frac{20000}{6400} = 3.125 = b^3$

$b = \sqrt[3]{3.125} = 3.125^{1/3} = 1.462$

$\boxed{y = 6400(1.462)^x \text{ growth function}}$

Find the annual growth rate for the number of users of this website. ***ANSWER:*** 46.2 %
State your answer rounded to tenths of a percent

$b = 1 + r = 1.462$ $r = .462$

4. An auto repair shop purchased equipment for $80,000; its value decreases at the rate of 14% per year.

a. [*2 points*] **Write the exponential decay function in form $y = ab^x$.**

$r = -.14$ $b = 1 + r = 1 + (-.14) = .86$

$\boxed{y = 80000(.86)^x \text{ decay function}}$

b. [*2 points*] **Find the value of the equipment at the end of 5 years after purchase.**
Round answer to the nearest whole dollar.

$y = 80000(.86^5) = \$37634.$

c. [*3 points*] **How many years does it take until the value of the equipment is only $50,000?**
Round answer to the nearest hundredth of a year; 2 decimal places.

You must show algebra work using the appropriate method/ strategy covered in class to solve this.
Trial and error, guess and check, table of values, or otherwise substituting numbers into "find" the solution are not acceptable.

$50000 = 80000(.86^t)$

$\frac{50000}{80000} = .625 = .86^t$

$t = \log_{.86} .625 = \frac{\ln .625}{\ln .86} = \boxed{3.12 \text{ years}}$

TURN OVER FOR QUESTIONS 5 & 6

KEY

5. A company has 1,200 employees. Its staff is growing at the annual rate of 2.7% per year.

a. [*2 points*] **Write the exponential growth function in form $y = ab^x$.**

$r = .027 \quad b = 1 + r = 1.027$

$y = 1200(1.027)^x$

b. [*3 points*] If the number of employees continues to grow at this pace each year, **after how many years will the company have 1,500 employees?** *Round answer to the nearest hundredth of a year; 2 decimal places.*

You must show algebra work using the appropriate method/ strategy covered in class to solve this.
Trial and error, guess and check, table of values, or otherwise substituting numbers into "find" the solution are not acceptable.

$1500 = 1200(1.027)^x$

$\frac{1500}{1200} = \frac{1200}{1200}(1.027)^x$

$1.25 = 1.027^x$

$x = \log_{1.027} 1.25 = \frac{\ln 1.25}{\ln 1.027} = \boxed{8.4 \text{ years}}$

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6. [*2 points*] The population of a town has been decreasing at the continuous decay rate of 4.1% per year. At the end of the 7th year the population is 42,000. The equation is: $y = ae^{-.041t}$
What was the initial population of this town at time t = 0?

You must show algebra work using the appropriate method/ strategy covered in class to solve this.
Trial and error, guess and check, table of values, or otherwise substituting numbers into "find" the solution are not acceptable.

$y = ae^{-.041t}$

$42000 = ae^{-.041 \times 7}$

$42000 = ae^{-.287}$

$42000 = a(.7505)$

$a = \frac{42000}{.7505} = 55963$ people in the town at time $t = 0$