

MATH 105

NAME \_\_\_\_\_

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Test #3: 4.4-4.8, 4.10

1. (12) The price of an item is increasing due to inflation. If  $p(t)$  is the price of the item  $t$  years after 1970, then  $p(t) = 7.50(1.058)^t$ .

a. By what rate does the price increase each year?

b. At what continuous annual rate is the price increasing? Use four decimal places in your answer.

2. (15) For the graph of the function  $f(x) = \log(2x + 6)$ , what is the:

a. Domain \_\_\_\_\_

b. Range \_\_\_\_\_

c.  $x$  intercept \_\_\_\_\_

d.  $y$  intercept \_\_\_\_\_

e. asymptote \_\_\_\_\_

3. (10) If you deposit in an account that earns 6% annual interest compounded monthly, what is the effective annual yield? Use four decimal places in your answer.

4. (10) Solve the equation  $\log(t - 175) = 3$  for  $t$  exactly.

5. (10) Solve the equation  $200e^{0.6t} = 300$  for  $t$  exactly.

6. (10) A radioactive isotope decays according to the formula  $N(t) = N_0e^{-0.02t}$ , where  $N(t)$  gives the amount still present after  $t$  hours. Find the half-life of the isotope. Use two decimal places in your answer.

7. (10) How long will it take a given amount of money to double if it is invested at 9% annual interest compounded monthly? Use two decimal places in your answer.

8. (13) The world population in 1950 was 2.5 billion people and had grown to 5.5 billion people in 1990.

a. Determine an exponential function to model the world population  $P$  as a function of  $t$  the number of years since 1950. Use four decimal places in your answer.

b. According to this model, in what year will the world population reach 11 billion people?

9. (10) The number of data packets (in billions) handled each month by IUP's gateway to the internet was sampled in 6 month intervals.

month	0	6	12	18	24	30
data packets (billions)	1.8	2.2	4.1	5	7.8	10.5

Find the exponential function of best fit  $d = ae^{kt}$  for this data. Use four decimal places in your answer.