

Math 1311

Homework 7 (Section 4.1 - Section 4.2)

Record your answers to all the problems in the EMCF titled “**Homework 7**”.

- Suppose that f is an exponential function with decay factor 0.099 and that $f(0) = 100$. Find a formula for $f(x)$.
 - $f(x) = 0.099 \times 100^x$
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- A certain phenomenon has initial value 8 and decays by 11% each year. Give an exponential function that describes this phenomenon using variable t for time in years.
 - 8×11^t
 - 0.11×8^t
 - 0.89×8^t
 - 8×0.89^t

- The exponential function $N = 1500 \times 1.19^d$, where d is measured in decades, gives the number of individuals in a certain population. Find the yearly growth factor (round to the nearest thousandth).
 - 0.190
 - 5.695
 - 1.018
 - 4.695

- The exponential function $N = 1000 \times 1.32^d$, where d is measured in decades, gives the number of individuals in a certain population. Find the percentage growth rate (rounded to two decimal places) per century.
 - 32.00%
 - 1605.98%
 - 1505.98%
 - 16.06%

5. You initially invest \$250 in a savings account that pays a yearly interest rate of 5%. Determine how long it will take for the account to reach \$407.22. (take ln or solve.)
- a) 5 years
 - b) 8 years
 - c) 9 years
 - d) 10 years
6. Suppose a certain radioactive substance has a half-life of 2 years. Find how long it will take for 400 grams of the substance to decay to 25 grams.
- a) 6 years
 - b) 8 years
 - c) 10 years
 - d) 12 years
7. The yearly *inflation rate* tells the percentage by which prices increase. In 1990 an individual retired on a fixed income of \$46,000 per year. Assuming that the inflation rate remains constant at 9%, determine how long it will take in years (rounded to the nearest hundredth) for the retirement income to deflate to half its 1990 value. (*Note:* To say that retirement income has deflated to half its 1990 value means that prices have doubled.)
- a) 28.79 years
 - b) 7.35 years
 - c) 22.22 years
 - d) 8.04 years
8. Suppose a country had a population of 91.68 million in 1975 For the years 1975 to 1985 the population grew at a rate of 4.9% per year. Express in functional notation the population of this country in 1982 and calculate that value (rounded to the nearest hundredth). Assume the formula gives the population N in millions of this country with respect to time t in years from 1975
- a) $N(7) = 123.13$
 - b) $N(7) = 128.15$
 - c) $N(1982) = 64.50$
 - d) $N(7) = 64.50$

9. The exponential function $N = 1500 \times 1.19^d$, where d is measured in decades, gives the number of individuals in a certain population. Find the yearly growth factor (round to the nearest thousandth).

- a) 0.190
- b) 5.695
- c) 1.018
- d) 4.695

10. Find a formula for the exponential function $N = N(t)$ using the information $N(2) = 3375$ and $N(5) = 1$.

- a) $N = 3375 \times (1/15)^t$
- b) $N = 15 \times (1/15)^t$
- c) $N = 759,375 \times (1/15)^t$
- d) $N = 15 \times (1/3375)^t$

11. Determine whether the following table shows exponential data or linear data.

x	0	5	10	15
y	62	135.9	298	653.4

- a) The data are linear.
- b) The data are exponential.

12. For the exponential function $N = N(t)$, increasing t by 1 unit multiplies N by a^6 , where $a > 0$. How does an increase by 7 units affect N ?

- a) a^{13}
- b) a^{42}
- c) a^7
- d) a^{84}

13. In order to determine its rate of decay, 1 gram of an unknown radioactive isotope was placed in a container. The amount remaining was measured at 1-minute intervals and recorded in the table below.

Time (in minutes)	Grams remaining
0	1.000
1	0.956
2	0.914
3	0.874
4	0.835
5	0.799

Find an exponential model for the data with variable M corresponding to remaining mass (in grams) and t corresponding to time (in minutes).

- a) $M = 1 \times 95.600^t$
b) $M = 0.956 \times 1^t$
c) $M = 1 \times 0.956^t$
d) $M = 95.600 \times 1^t$
14. You have invested money in a savings account that pays a fixed monthly interest on the account balance. The following table shows the account balance over the first 5 months.

Time (in months)	Savings balance
0	\$1350.00
1	\$1367.55
2	\$1385.33
3	\$1403.34
4	\$1421.58
5	\$1440.06

Find how long it takes for your money to double in value.

- a) 53.66 years
b) 4.47 years
c) 52.97 years
d) 23.67 years

15. The following table shows the income, measured in thousands of dollars, from sales of a certain magazine at the start of the given year. Find an exponential model for the income where I is the income, measured in thousands of dollars, and t is the number of years since 2000. Round the parameters to the nearest hundredth.

<i>Year</i>	2000	2001	2002	2003	2004
<i>Income</i>	7.54	8.02	8.52	9.05	9.62

- a) $I = 7.54 \times 1.06^t$
- b) $I = 7.51 \times 0.52^t$
- c) $I = 1.06 \times 7.51^t$
- d) $I = 7.54 \times 0.52^t$

16. Section 4.1 Skill Building Exercise S-2

- a) $A = 4 \times 8^t$
- b) $A = 8 \times 4^t$
- c) $A = 10 \times 7^t$
- d) $A = 7 \times 4^t$

17. Section 4.1 Skill Building Exercise S-4

- a) $A = 0.7 \times 25^t$
- b) $A = .25 \times 7^t$
- c) $A = 25 \times 0.7^t$
- d) $A = 0.7 \times .25^t$

18. Exercise 4.1 Skill Building Exercise S-6

a) $A = \frac{3}{4^t}$

b) $A = \frac{7}{10^t}$

c) $A = \frac{4}{3^t}$

d) $A = \frac{10}{7^t}$

19. Section 4.2 Skill Building Exercise S-2

a) 261%

b) 60%

c) 361%

d) 61%

20. Section 4.2 Skill Building Exercise S-4

a) 94%

b) 6%

c) 60%

d) 96%