Algebra 1

HW39: Exponential vs. Linear Functions

1) In at least three sentences, compare and contrast linear and exponential functions.

Determine if the scenarios represent linear or eponential functions. Then, write a function definition.

2) A library has 1000 books and adds 300 more every month.

3) A colony of 4000 mold spores grows by 34% per week.

4) A bank account with $500 doubles in size every year.

5) David has $500 in savings. Every month, he adds $20 to the account.

6) Cassandra pays a flat fee of $145 to rent a car, plus $0.52 per mile driven.

7) There are 50,000 lions in the wild. Every decade, the population is halved.

8) The temperature of a pizza that just came out of the oven at 450° is halved every 20 minutes.

9) The price of a bouquet of flowers starts at $2 and increases by $0.50 for each flower added.

Determine if the table represents a linear function, an exponential function, or neither. If linear or exponential, write a function definition for the table. (Hint: look for the pattern in the output values. If the same number is being added, it's linear. If the same number is being multiplied, it's exponential.)

10)

x	0	1	2	3	4	5
$f(x)$	17	19	21	23	25	27

11)

x	0	1	2	3	4	5
$f(x)$	−1	1	7	17	31	49

12)

x	0	1	2	3	4	5
$f(x)$	2	6	18	54	162	486

13)

x	0	1	2	3	4	5
$f(x)$	64	32	16	8	4	2

14)

x	0	1	2	3	4	5
$f(x)$	−8	−10	−12	−14	−16	−18

15)

x	0	1	2	3	4	5
$f(x)$	128	64	32	16	8	4

16)

x	0	1	2	3	4	5
$f(x)$	1	−4	−9	−14	−19	−24

17)

x	0	1	2	3	4	5
$f(x)$	4	12	36	108	324	972

18)

x	0	1	2	3	4	5
$f(x)$	10	8	6	4	2	0

19)

x	0	1	2	3	4	5
$f(x)$	4	6	12	22	36	54

Use the following scenario for the last questions.
Mr. Wiggins gives his daughter Cecilia two options for payment for picking weeds from the yard:
1) $1 for each bag of leaves filled
2) Paid as follows: 2 cents for filling one bag, 4 cents for filling two bags, 8 cents for filling three bags, and so on, with the amount doubling for each additional bag filled.

20) Write functions for both options.

21) If Cecilia picks five bags, should she choose option 1 or option 2?

22) If Cecilia picks ten bags, should she choose option 1 or option 2?

23) How many bags does Cecilia need to fill before option 2 becomes the better option?

Simplify. Your answer should contain only positive exponents.

24) $4b^5 \cdot 3b^2$

25) $6n^6 \cdot 5n^4$

26) $\left(4n^3\right)^4$

27) $\left(x^{-2}\right)^5$

28) $\dfrac{v}{2v^{-2}}$

29) $\dfrac{4x^0}{4x^{-2}}$