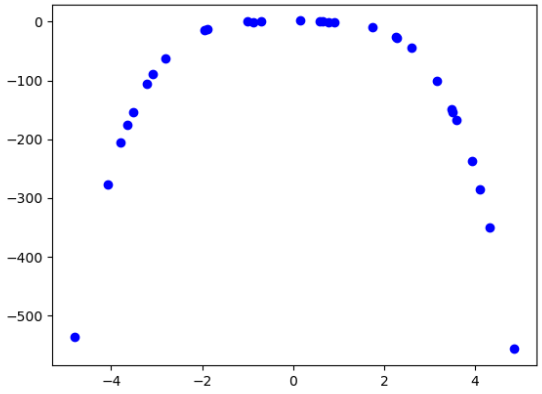
1. Determine the appropriate model for the graph of points below.



A. Linear model

B. Exponential model

C. Non-linear Power model

D. Logarithmic model

E. None of the above

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2. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 3 bacteria-α. After 2 hours, the petri dish has 961 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 86 minutes

B. About 187 minutes

C. About 14 minutes

D. About 31 minutes

E. None of the above

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3. A town has an initial population of 90000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop.	89980	89960	89940	89920	89900	89880	89860	89840	89820

A. Non-Linear Power

B. Exponential

C. Logarithmic

D. Linear

E. None of the above

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4. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 797 grams of element X and after 14 years there is 199 grams remaining.

A. About 2190 days

B. About 5475 days

C. About 3650 days

D. About 1095 days

E. None of the above

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5. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 4 bacteria-α. After 1 hours, the petri dish

has 94 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 78 minutes

B. About 27 minutes

C. About 13 minutes

D. About 164 minutes

E. None of the above

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6. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 190° *C and is placed into a* 14° *C bath to cool. After 39 minutes, the uranium has cooled to* 132° *C.*

A. $k = -0.01982$

B. $k = -0.01958$

C. $k = -0.01221$

D. $k = -0.01221$

E. None of the above

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7. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is

initially 652 grams of element X and after 8 years there is 130 grams remaining.

A. About 1460 days

B. About 1095 days

C. About 3285 days

D. About 365 days

E. None of the above

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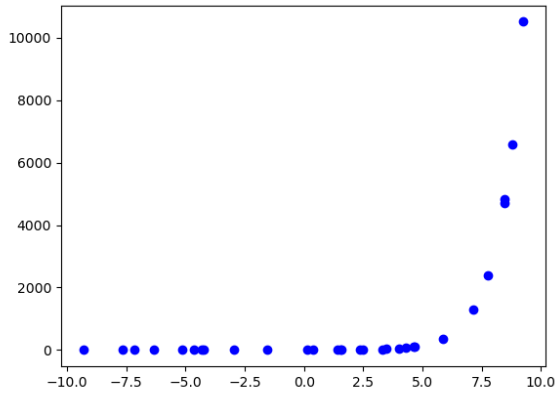
8. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Logarithmic model

D. Linear model

E. None of the above

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9. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's

temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 100° *C and is placed into a* 18° *C bath to cool. After 18 minutes, the uranium has cooled to* 56° *C.*

A. $k = -0.03605$

B. $k = -0.03738$

C. $k = -0.05375$

D. $k = -0.05375$

E. None of the above

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10. A town has an initial population of 20000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop.	20020	20040	20060	20080	20100	20120	20140	20160	20180

A. Non-Linear Power

B. Linear

C. Exponential

D. Logarithmic

E. None of the above
