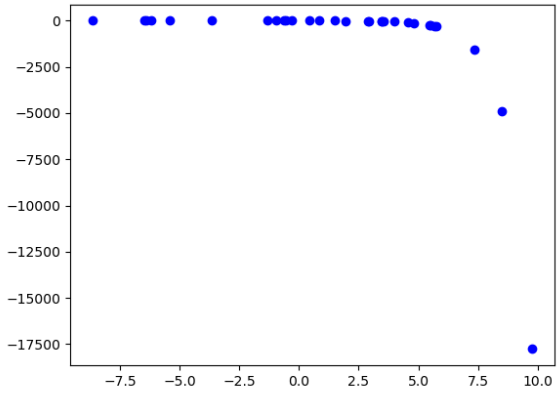
1. Determine the appropriate model for the graph of points below.



   A. Logarithmic model

   B. Exponential model

   C. Non-linear Power model

   D. Linear 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 861 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

   A. About 176 minutes

   B. About 264 minutes

   C. About 29 minutes

   D. About 44 minutes

   E. None of the above

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3. A town has an initial population of 80000. 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.	79910	79730	79190	77570	72710	58130	14390	0	0

A. Logarithmic

B. Non-Linear Power

C. Exponential

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 856 grams of element X and after 17 years there is 122 grams remaining.

A. About 2920 days

B. About 2190 days

C. About 7665 days

D. About 730 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 3 bacteria-α. After 1 hours, the petri dish

has 42 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 188 minutes

B. About 238 minutes

C. About 39 minutes

D. About 31 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 100° *C and is placed into a* 19° *C bath to cool. After 27 minutes, the uranium has cooled to* 52° *C.*

A. $k = -0.02401$

B. $k = -0.03326$

C. $k = -0.02310$

D. $k = -0.04106$

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 706 grams of element X and after 20 years there is 88 grams remaining.

A. About 730 days

B. About 3285 days

C. About 9490 days

D. About 2190 days

E. None of the above

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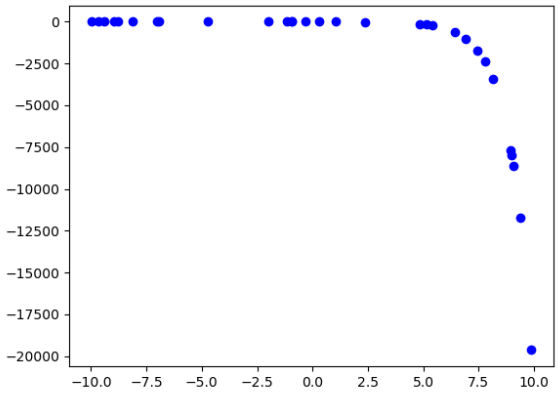
8. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Logarithmic model

C. Linear model

D. Exponential 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 160° *C and is placed into a* 15° *C bath to cool. After 31 minutes, the uranium has cooled to* 97° *C.*

A. $k = -0.02378$

B. $k = -0.02156$

C. $k = -0.02340$

D. $k = -0.02156$

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.	20160	20640	22560	30240	60960	183840	675360	2641440	1050576

A. Logarithmic

B. Exponential

C. Non-Linear Power

D. Linear

E. None of the above
