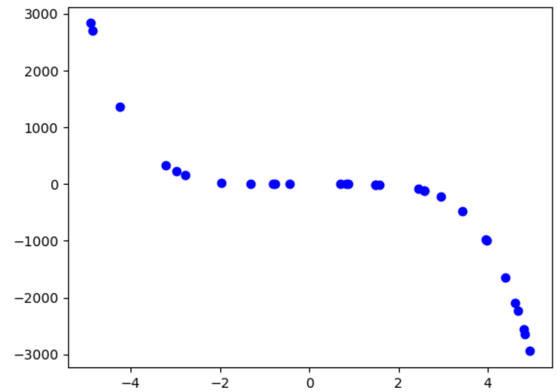
1. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Linear model

C. Exponential model

D. Non-linear Power model

E. None of the above

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2. 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 $170°$ *C and is placed into a* $12°$ *C bath to cool. After 16 minutes, the uranium has cooled to* $119°$ *C.*

A. $k = -0.02436$

B. $k = -0.04817$

C. $k = -0.02894$

D. $k = -0.04760$

E. None of the above

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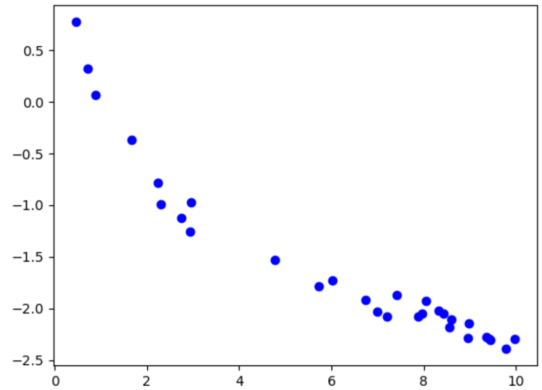
3. Determine the appropriate model for the graph of points below.



A. Linear model

B. Non-linear Power model

C. Exponential model

D. Logarithmic model

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 714 grams of element X and after 8 years there is 142 grams remaining.

A. About 365 days

B. About 1460 days

C. About 3285 days

D. About 1095 days

E. None of the above

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5. 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 180° *C and is placed into a* 10° *C bath to cool. After 16 minutes, the uranium has cooled to* 135° *C.*

A. $k = -0.02279$

B. $k = -0.04918$

C. $k = -0.04873$

D. $k = -0.02279$

E. None of the above

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6. 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 2 bacteria-*α*. After 3 hours, the petri dish has 21399 bacteria-*α*. Based on similar bacteria, the lab believes bacteria-*α *quadruples after some undetermined number of minutes.*

A. About 80 minutes

B. About 25 minutes

C. About 13 minutes

D. About 150 minutes

E. None of the above

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7. A town has an initial population of 50000. 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.	50000	50034	50054	50069	50080	50089	50097	50103	50109

A. Exponential

B. Logarithmic

C. Linear

D. Non-Linear Power

E. None of the above

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8. A town has an initial population of 40000. 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.	40000	40034	40054	40069	40080	40089	40097	40103	40109

A. Non-Linear Power

B. Logarithmic

C. Linear

D. Exponential

E. None of the above

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9. 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 982 grams of element X and after 19 years there is 163 grams remaining.

A. About 2555 days

B. About 3650 days

C. About 8395 days

D. About 1095 days

E. None of the above

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10. 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 2 hours, the petri dish has 73 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 28 minutes

B. About 171 minutes

C. About 57 minutes

D. About 347 minutes

E. None of the above
