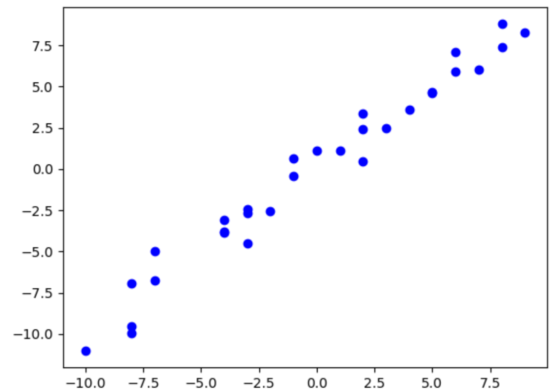
1. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Linear model

C. Logarithmic 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 100° *C and is placed into a* 11° *C bath to cool. After 14 minutes, the uranium has cooled to* 34° *C.*

A. $k = -0.10498$

B. $k = -0.04081$

C. $k = -0.09665$

D. $k = -0.03996$

E. None of the above

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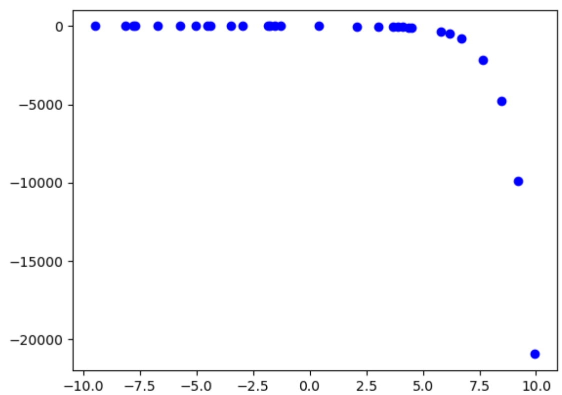
3. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Exponential model

C. Linear model

D. Non-linear Power 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 947 grams of element X and after 10 years there is 118 grams remaining.

A. About 1460 days

B. About 365 days

C. About 1095 days

D. About 4380 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 $140°$ *C and is placed into a* $18°$ *C bath to cool. After 13 minutes, the uranium has cooled to* $81°$ *C.*

A. $k = -0.05084$

B. $k = -0.06142$

C. $k = -0.05364$

D. $k = -0.05491$

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 4 bacteria-α. After 2 hours, the petri dish has 139 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 362 minutes

B. About 222 minutes

C. About 37 minutes

D. About 60 minutes

E. None of the above

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7. 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.	90020	90040	90060	90080	90100	90120	90140	90160	90180

A. Logarithmic

B. Non-Linear Power

C. Linear

D. Exponential

E. None of the above

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8. 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	50020	50032	50041	50048	50053	50058	50062	50065

A. Linear

B. Exponential

C. Non-Linear Power

D. Logarithmic

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 787 grams of element X and after 12 years there is 87 grams remaining.

A. About 1825 days

B. About 365 days

C. About 5840 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 1 hours, the petri dish has 70 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 39 minutes

B. About 174 minutes

C. About 29 minutes

D. About 234 minutes

E. None of the above
