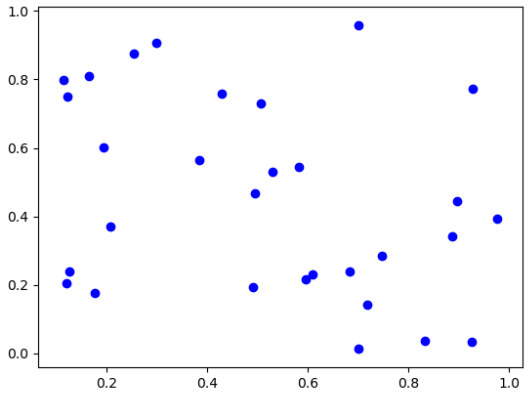
1. Determine the appropriate model for the graph of points below.



A. Linear model

B. Exponential 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 160° *C and is placed into a* 16° *C bath to cool. After 15 minutes, the uranium has cooled to* 107° *C.*

A. $k = -0.03060$

B. $k = -0.05037$

C. $k = -0.04950$

D. $k = -0.03762$

E. None of the above

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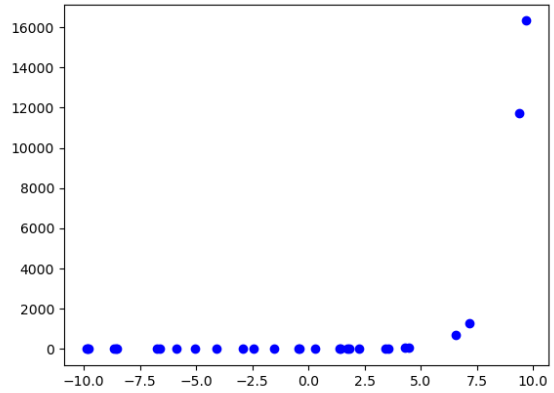
3. Determine the appropriate model for the graph of points below.



A. Linear model

B. Logarithmic model

C. Exponential 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 995 grams of element X and after 12 years there is 199 grams remaining.

A. About 1825 days

B. About 2555 days

C. About 730 days

D. About 5110 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* 19° *C bath to cool. After 37 minutes, the uranium has cooled to* 86° *C.*

A. $k = -0.01913$

B. $k = -0.01992$

C. $k = -0.01992$

D. $k = -0.01961$

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 3 hours, the petri dish has 3179 bacteria-*α*. Based on similar bacteria, the lab believes bacteria-*α *quadruples after some undetermined number of minutes.*

A. About 37 minutes

B. About 61 minutes

C. About 224 minutes

D. About 371 minutes

E. None of the above

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7. A town has an initial population of 60000. 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.	60120	60360	61080	63240	69720	89160	147480	322440	847320

A. Exponential

B. Linear

C. Non-Linear Power

D. Logarithmic

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	50027	50043	50055	50064	50071	50077	50083	50087

A. Logarithmic

B. Exponential

C. Non-Linear Power

D. Linear

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 670 grams of element X and after 9 years there is 67 grams remaining.

A. About 0 days

B. About 1095 days

C. About 4380 days

D. About 730 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 13 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 333 minutes

B. About 55 minutes

C. About 347 minutes

D. About 57 minutes

E. None of the above
