1. 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.	59978	59966	59938	59926	59898	59886	59858	59846	59818

   A. Logarithmic

   B. Exponential

   C. Non-Linear Power

   D. Linear

   E. None of the above

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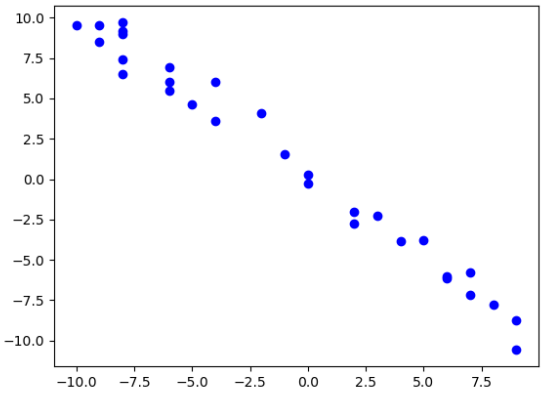
2. Determine the appropriate model for the graph of points below.



   A. Logarithmic model

   B. Non-linear Power model

   C. Linear model

   D. Exponential model

   E. None of the above

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3. 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 1 hours, the petri dish has 16 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 38 minutes

B. About 230 minutes

C. About 31 minutes

D. About 188 minutes

E. None of the above

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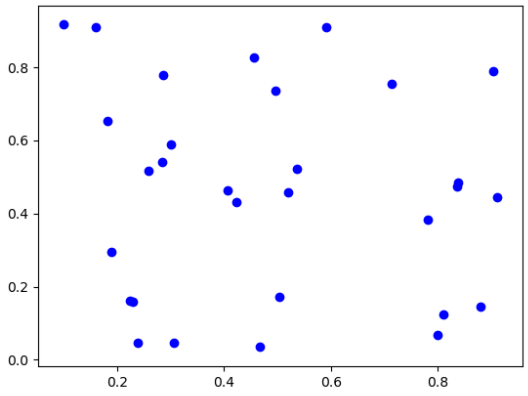
4. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Linear model

D. Logarithmic model

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 120° *C and is placed into a* 13° *C bath to cool. After 31 minutes, the uranium has cooled to* 52° *C.*

   A. $k = -0.02042$

   B. $k = -0.03626$

   C. $k = -0.02083$

   D. $k = -0.03626$

   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 120° *C and is placed into a* 15° *C bath to cool. After 13 minutes, the uranium has cooled to* 53° *C.*

   A. $k = -0.04949$

   B. $k = -0.08845$

   C. $k = -0.04835$

   D. $k = -0.08845$

   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.	90000	89965	89945	89930	89919	89910	89902	89896	89890

A. Linear

B. Exponential

C. Logarithmic

D. Non-Linear Power

E. None of the above

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8. 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 859 grams of element X and after 6 years there is 95 grams remaining.

A. About 365 days

B. About 2555 days

C. About 0 days

D. About 730 days

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 720 grams of element X and after 19 years there is 72 grams remaining.

A. About 365 days

B. About 9490 days

C. About 1825 days

D. About 2920 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 2 bacteria-α. After 3 hours, the petri dish has 1784 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 33 minutes

B. About 199 minutes

C. About 18 minutes

D. About 110 minutes

E. None of the above
