1. 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.	90054	90096	90146	90204	90254	90296	90346	90404	90454

   A. Linear

   B. Exponential

   C. Non-Linear Power

   D. Logarithmic

   E. None of the above

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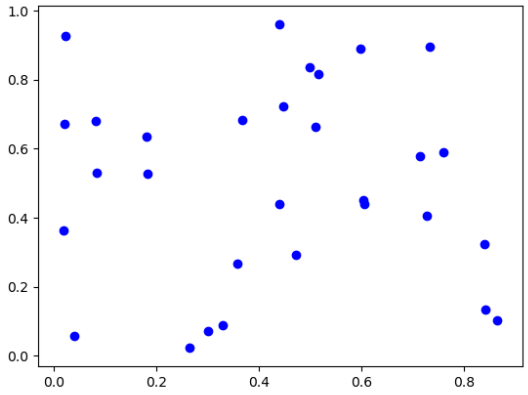
2. Determine the appropriate model for the graph of points below.



   A. Exponential model

   B. Logarithmic model

   C. Linear model

   D. Non-linear Power model

   E. None of the above

---

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

A. About 228 minutes

B. About 24 minutes

C. About 144 minutes

D. About 38 minutes

E. None of the above

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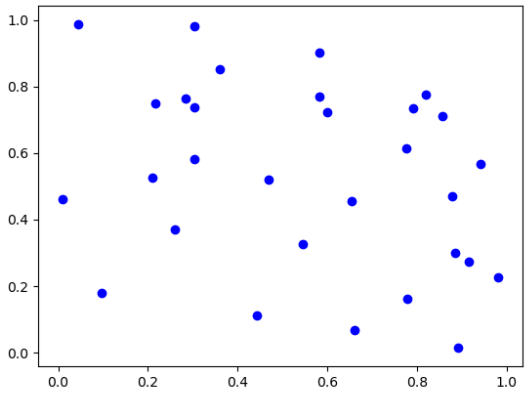
4. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Exponential model

C. Logarithmic model

D. Linear 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 190° *C and is placed into a* 20° *C bath to cool. After 40 minutes, the uranium has cooled to* 145° *C.*

   A. $k = -0.01047$

   B. $k = -0.01047$

   C. $k = -0.01932$

   D. $k = -0.01967$

   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 190° *C and is placed into a* 20° *C bath to cool. After 30 minutes, the uranium has cooled to* 123° *C.*

   A. $k = -0.02473$

   B. $k = -0.02041$

   C. $k = -0.02518$

   D. $k = -0.01670$

   E. None of the above

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7. 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.	79977	79965	79937	79925	79897	79885	79857	79845	79817

A. Non-Linear Power

B. Exponential

C. Logarithmic

D. Linear

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 749 grams of element X and after 7 years there is 124 grams remaining.

A. About 2920 days

B. About 730 days

C. About 1095 days

D. About 365 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 606 grams of element X and after 14 years there is 121 grams remaining.

A. About 2920 days

B. About 730 days

C. About 5840 days

D. About 2190 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 3 bacteria-α. After 2 hours, the petri dish has 210 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 55 minutes

B. About 334 minutes

C. About 39 minutes

D. About 234 minutes

E. None of the above
