1. A town has an initial population of 20000. 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	20026	20056	20094	20124	20146	20176	20214	20244	20266

A. Linear

B. Exponential

C. Logarithmic

D. Non-Linear Power

E. None of the above

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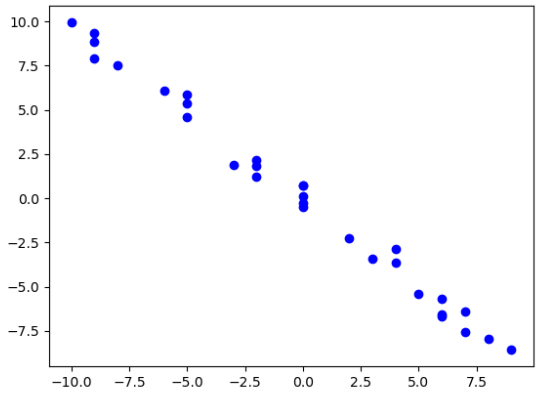
2. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Logarithmic model

C. Linear model

D. Exponential model

E. None of the above

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3. 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 866 grams of element X and after 6 years there is 173 grams remaining.

A. About 1095 days

B. About 365 days

C. About 2555 days

D. About 730 days

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 557 grams of element X and after 9 years there is 92 grams remaining.

A. About 365 days

B. About 1095 days

C. About 1460 days

D. About 4015 days

E. None of the above

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5. 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 42 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 39 minutes

B. About 188 minutes

C. About 31 minutes

D. About 238 minutes

E. None of the above

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6. 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	60000	60034	60054	60069	60080	60089	60097	60103	60109

A. Exponential

B. Non-Linear Power

C. Logarithmic

D. Linear

E. None of the above

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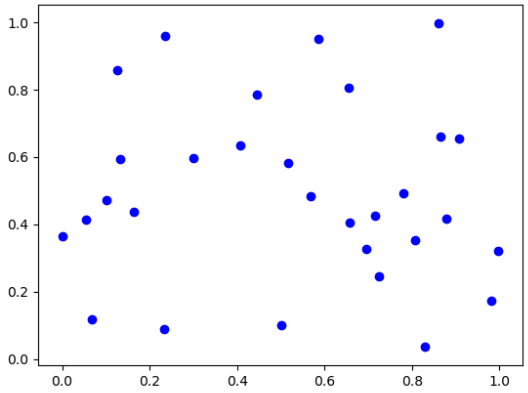
7. Determine the appropriate model for the graph of points below.



A. Non-linear Power model

B. Logarithmic model

C. Linear model

D. Exponential model

E. None of the above

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8. 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 150° *C and is placed into a* 15° *C bath to cool. After 32 minutes, the uranium has cooled to* 86° *C.*

A. $k = -0.02216$

B. $k = -0.02256$

C. $k = -0.02337$

D. $k = -0.02008$

E. None of the above

9. 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 3 hours, the petri dish has 647 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

   A. About 139 minutes

   B. About 23 minutes

   C. About 298 minutes

   D. About 49 minutes

   E. None of the above

10. 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 16° C bath to cool. After 40 minutes, the uranium has cooled to 111° C.

    A. $k = -0.01455$

    B. $k = -0.01455$

    C. $k = -0.01886$

    D. $k = -0.01855$

    E. None of the above