1. 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 1416 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

   A. About 192 minutes

   B. About 32 minutes

   C. About 54 minutes

   D. About 327 minutes

   E. None of the above

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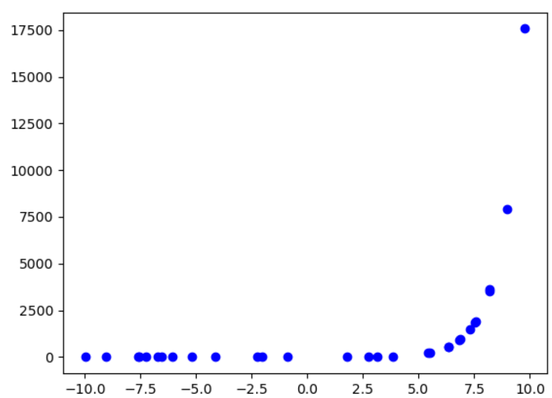
2. Determine the appropriate model for the graph of points below.



   A. Logarithmic model

   B. Non-linear Power model

   C. Exponential model

   D. Linear 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 3 bacteria-α. After 3 hours, the petri dish has 346 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 41 minutes

B. About 405 minutes

C. About 249 minutes

D. About 67 minutes

E. None of the above

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4. 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	80050	80100	80150	80200	80250	80300	80350	80400	80450

A. Linear

B. Exponential

C. Non-Linear Power

D. Logarithmic

E. None of the above

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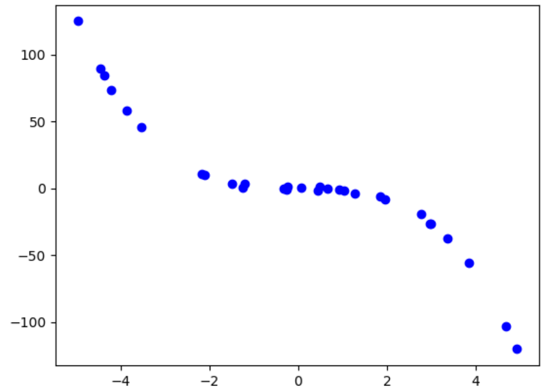
5. Determine the appropriate model for the graph of points below.



A. Linear model

B. Non-linear Power model

C. Logarithmic model

D. Exponential model

E. None of the above

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6. 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 997 grams of element X and after 12 years there is 249 grams remaining.

A. About 730 days

B. About 1825 days

C. About 2920 days

D. About 4745 days

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	90040	90080	90160	90320	90640	91280	92560	95120	100240

A. Exponential

B. Logarithmic

C. Non-Linear Power

D. Linear

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 $190°$ *C and is placed into a* $15°$ *C bath to cool. After 33 minutes, the uranium has cooled to* $135°$ *C.*

A. $k = -0.02322$

B. $k = -0.01143$

C. $k = -0.01393$

D. $k = -0.02353$

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 927 grams of element X and after 7 years there is 103 grams remaining.

A. About 0 days

B. About 3285 days

C. About 730 days

D. About 1095 days

E. None of the above

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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* 17° *C bath to cool. After 29 minutes, the uranium has cooled to* 123° *C.*

A. $k = -0.02667$

B. $k = -0.01629$

C. $k = -0.01629$

D. $k = -0.02621$

E. None of the above
