1. 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* 12° *C bath to cool. After 31 minutes, the uranium has cooled to* 134° *C.*

   A. $k = -0.01429$

   B. $k = -0.04447$

   C. $k = -0.02481$

   D. $k = -0.02507$

   E. None of the above

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2. 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	90024	90058	90092	90126	90144	90178	90212	90246	90264

   A. Exponential

   B. Non-Linear Power

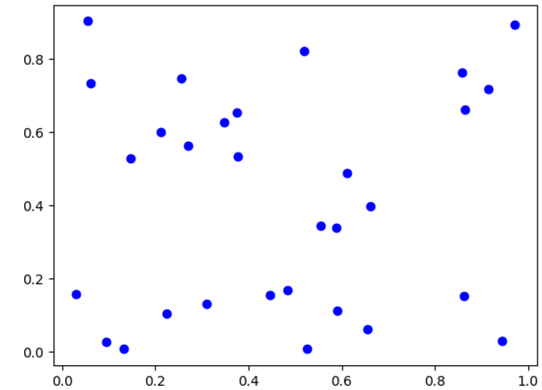
   C. Linear

   D. Logarithmic

   E. None of the above

---

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



A. Exponential model

B. Logarithmic model

C. Non-linear Power model

D. Linear model

E. None of the above

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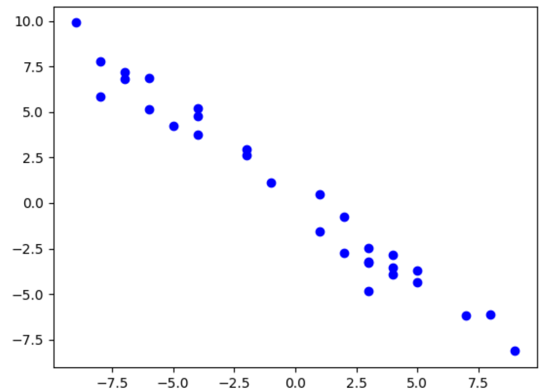
4. Determine the appropriate model for the graph of points below.



A. Linear model

B. Exponential model

C. Logarithmic model

D. Non-linear Power model

E. None of the above

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5. 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 511 grams of element X and after 6 years there is 85 grams remaining.

A. About 1095 days

B. About 0 days

C. About 2555 days

D. About 730 days

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 140° *C and is placed into a* 18° *C bath to cool. After 36 minutes, the uranium has cooled to* 91° *C.*

A. $k = -0.02053$

B. $k = -0.03063$

C. $k = -0.02006$

D. $k = -0.01809$

E. None of the above

7. 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 977 grams of element X and after 6 years there is 122 grams remaining.

A. About 0 days

B. About 730 days

C. About 365 days

D. About 2555 days

E. None of the above

8. A town has an initial population of 40000. 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	40000	40027	40043	40055	40064	40071	40077	40083	40087

A. Exponential

B. Logarithmic

C. Linear

D. Non-Linear Power

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 4 bacteria-α. After 3 hours, the petri dish has 678 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 38 minutes

B. About 231 minutes

C. About 411 minutes

D. About 68 minutes

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 2 hours, the petri dish has 81 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 56 minutes

B. About 339 minutes

C. About 27 minutes

D. About 165 minutes

E. None of the above

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11. 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 $130°$ C *and is placed into a* $15°$ C *bath to cool. After 24 minutes, the uranium has cooled to* $67°$ C.

A. $k = -0.02806$

B. $k = -0.04440$

C. $k = -0.03818$

D. $k = -0.02866$

E. None of the above

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12. A town has an initial population of 40000. 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	40024	40058	40092	40126	40144	40178	40212	40246	40264

A. Linear

B. Exponential

C. Logarithmic

D. Non-Linear Power

E. None of the above

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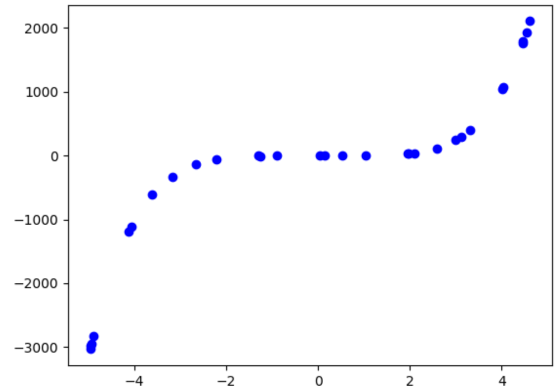
13. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Linear model

C. Non-linear Power model

D. Exponential model

E. None of the above

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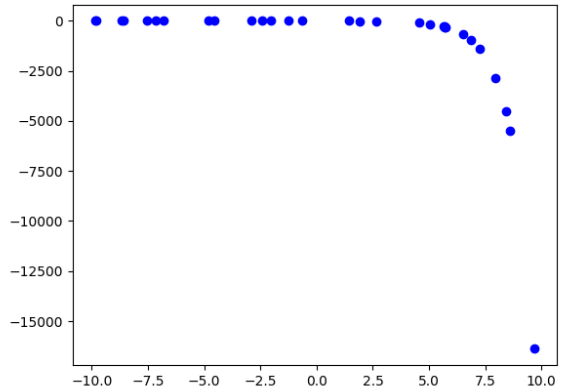
14. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Linear model

D. Logarithmic model

E. None of the above

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15. 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 607 grams of element X and after 4 years there is 86 grams remaining.

A. About 730 days

B. About 0 days

C. About 1825 days

D. About 365 days

E. None of the above

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16. 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 180° *C and is placed into a* 14° *C bath to cool. After 31 minutes, the uranium has cooled to* 140° *C.*

A. $k = -0.01151$

B. $k = -0.00889$

C. $k = -0.02553$

D. $k = -0.02519$

E. None of the above

17. 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 932 grams of element X and after 3 years there is 93 grams remaining.

A. About 0 days

B. About 365 days

C. About 1460 days

D. About 0 days

E. None of the above

18. 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	59965	59945	59930	59919	59910	59902	59896	59890

A. Exponential

B. Non-Linear Power

C. Logarithmic

D. Linear

E. None of the above

19. 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 7 bacteria-α. Based on similar bacteria, the lab believes bacteria-α doubles after some undetermined number of minutes.

A. About 53 minutes

B. About 319 minutes

C. About 49 minutes

D. About 298 minutes

E. None of the above

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20. 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 2 hours, the petri dish has 5176 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 116 minutes

B. About 63 minutes

C. About 10 minutes

D. About 19 minutes

E. None of the above

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21. 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* 18° *C bath to cool. After 35 minutes, the uranium has cooled to* 137° *C.*

A. $k = -0.01337$

B. $k = -0.01052$

C. $k = -0.02186$

D. $k = -0.02221$

E. None of the above

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22. 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	49966	49926	49886	49846	49806	49766	49726	49686	49646

A. Logarithmic

B. Exponential

C. Linear

D. Non-Linear Power

E. None of the above

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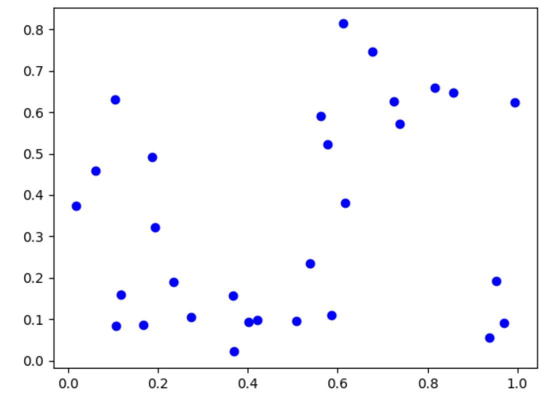
23. Determine the appropriate model for the graph of points below.



A. Linear model

B. Non-linear Power model

C. Logarithmic model

D. Exponential model

E. None of the above

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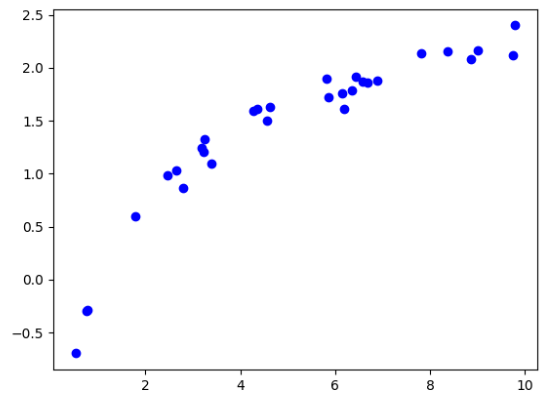
24. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Linear model

C. Logarithmic model

D. Non-linear Power model

E. None of the above

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25. 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 526 grams of element X and after 13 years there is 52 grams remaining.

A. About 6570 days

B. About 365 days

C. About 1095 days

D. About 1825 days

E. None of the above

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26. 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* 14° *C bath to cool. After 39 minutes, the uranium has cooled to* 126° *C.*

A. $k = -0.02000$

B. $k = -0.01972$

C. $k = -0.01070$

D. $k = -0.00850$

E. None of the above

27. 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 921 grams of element X and after 5 years there is 153 grams remaining.

A. About 730 days

B. About 365 days

C. About 0 days

D. About 2190 days

E. None of the above

28. 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	50026	50056	50094	50124	50146	50176	50214	50244	50266

A. Linear

B. Exponential

C. Logarithmic

D. Non-Linear Power

E. None of the above

29. 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 115 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 11 minutes

B. About 135 minutes

C. About 22 minutes

D. About 68 minutes

E. None of the above

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30. 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 2 hours, the petri dish has 467 bacteria-α. Based on similar bacteria, the lab believes bacteria-α quadruples after some undetermined number of minutes.

A. About 243 minutes

B. About 30 minutes

C. About 40 minutes

D. About 183 minutes

E. None of the above
