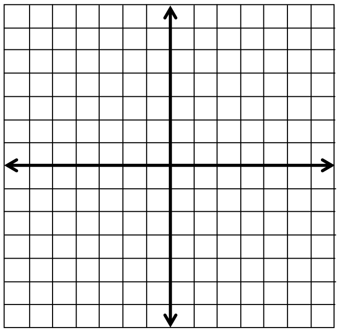
Alg. 2 Unit 11 Name:______________________________

Day 1 Worksheet – Graph Exponential Growth Functions Date:___________________ Period:______

1. $y = 5^x$



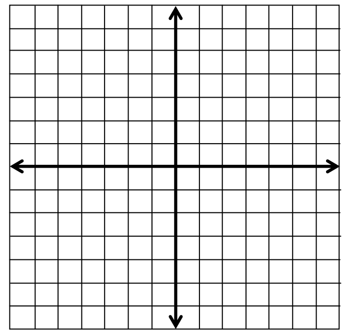
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

2. $f(x) = 2 \bullet 3^x$



Domain:

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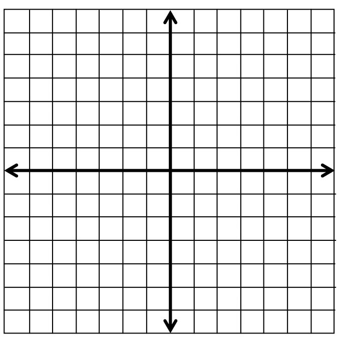
(**−1**, ________) (**0**, ________) (**1**, ________)

3. $g(x) = \frac{1}{2} \bullet 6^x$



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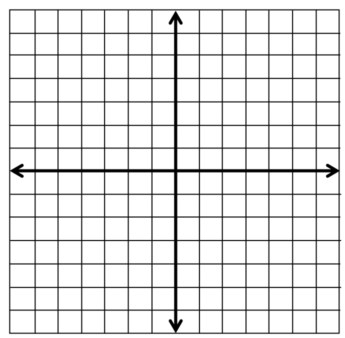
Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

4. $y = -2 \bullet 2^x$



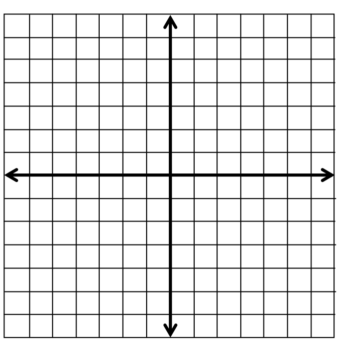
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

5. $g(x) = 2^{x+1} + 3$



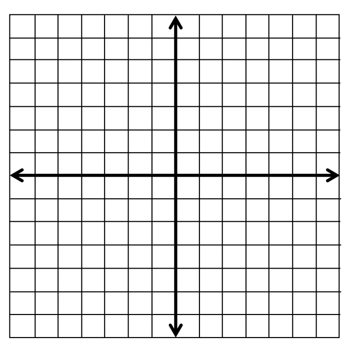
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

6. $y = -4^{x-2} + 6$



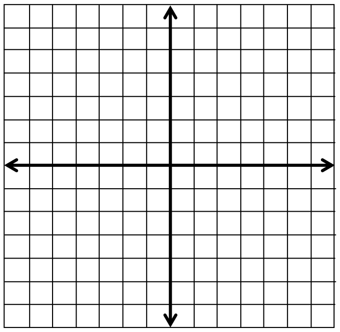
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

7. $f(x)=3\bullet 2^{x+5}-1$



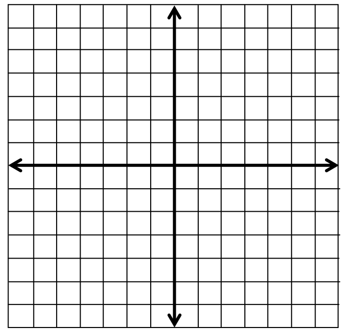
Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

8. $h(x)=-3^{x-4}+5$



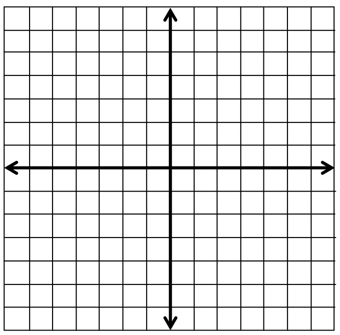
Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

9. $g(x)=3\bullet 2^{x-4}+1$



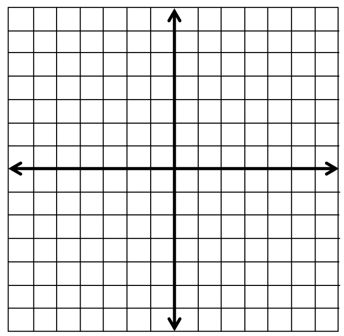
Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

10. $y=2\bullet 4^{x}-3$



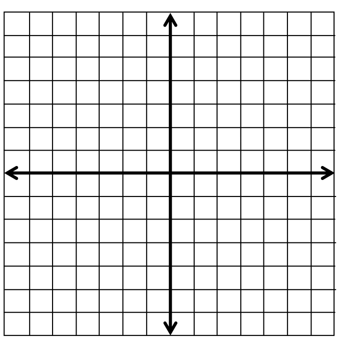
Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

11. $f(x)=3\bullet 2^{x+1}$



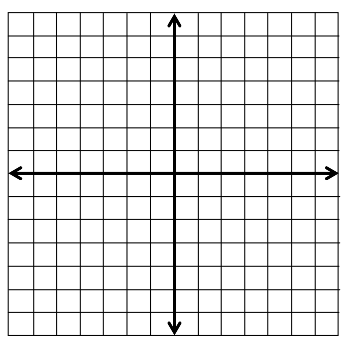
Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

12. $h(x)=-\frac{1}{4}\bullet 8^{x-3}+3$



Domain:

Range:

Asym:

(**−1**, ________) (**0**, _________) (**1**, ________)

Alg. 2 Unit 11 Name:________________________________

Day 2 Worksheet – Graph Exponential Decay Functions Date:____________________Period:______

Tell whether the function represents *exponential growth* or *exponential decay*

1. $f(x) = 3\left(\frac{3}{4}\right)^x$

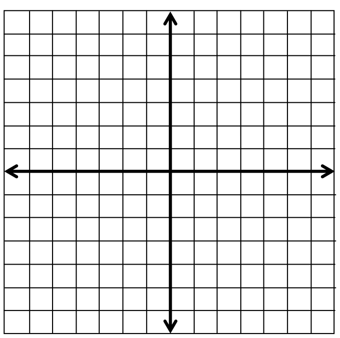
2. $f(x) = 4\left(\frac{5}{2}\right)^x$

3. $f(x) = \frac{2}{7} \bullet 4^x$

4. $f(x) = 25(0.25)^x$

Graph the following exponential functions, then state the domain and range.

5. $y = \left(\frac{1}{3}\right)^x$



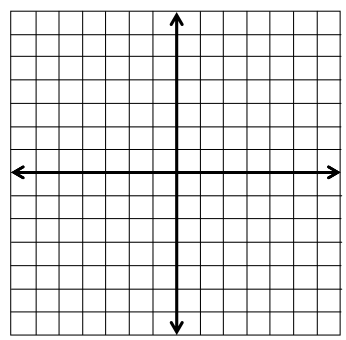
Domain:

Range:

Asym:

$(\mathbf{-1},$ ________) ($\mathbf{0},$ _________) ($\mathbf{1},$ ________)

6. $f(x) = -(0.2)^x$



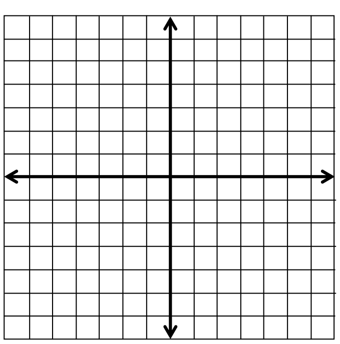
Domain:

Range:

Asym:

$(\mathbf{-1},$ ________) ($\mathbf{0},$ _________) ($\mathbf{1},$ ________)

7. $y = 2(0.75)^x$



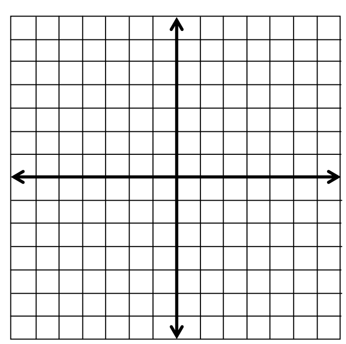
Domain:

Range:

Asym:

$(\mathbf{-1},$ ________) ($\mathbf{0},$ _________) ($\mathbf{1},$ ________)

8. $f(x) = -3\left(\frac{3}{8}\right)^x$



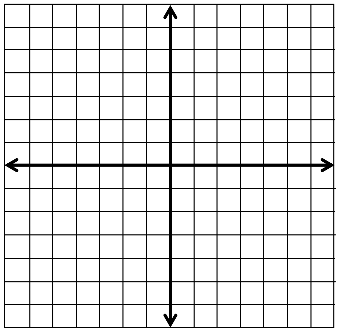
Domain:

Range:

Asym:

$(\mathbf{-1},$ ________) ($\mathbf{0},$ _________) ($\mathbf{1},$ ________)

9. $g(x) = \left(\frac{1}{3}\right)^{x} + 1$



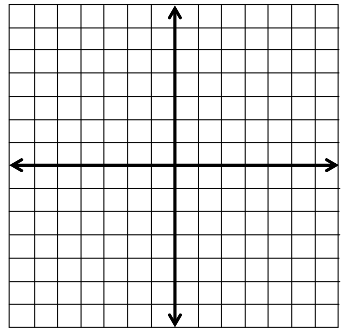
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

10. $h(x) = \left(\frac{1}{3}\right)^{x+1} - 3$



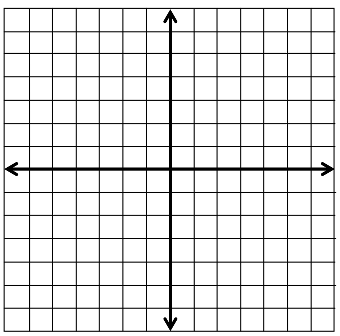
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

11. $y = 2\left(\frac{1}{2}\right)^{x-2} + 2$



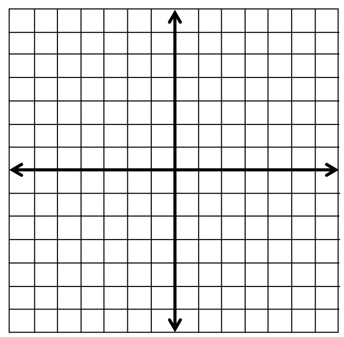
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

12. $y = 6\left(\frac{1}{2}\right)^{x+5} - 2$



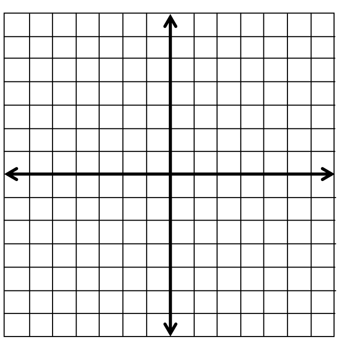
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

13. $y = \left(\frac{1}{2}\right)^{x-2} + 3$



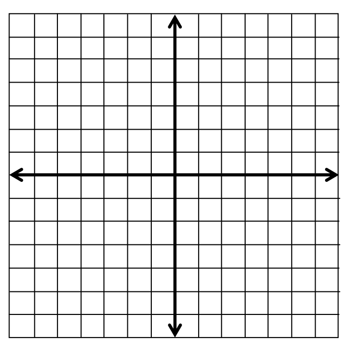
Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

14. $f(x) = \left(\frac{1}{4}\right)^{x} + 2$



Domain:

Range:

Asym:

(**−1**, ________) (**0**, ________) (**1**, ________)

Alg. 2 Unit 11 Name:______________________________

Day 3 Worksheet – Applications of Exponentials Date:____________________Period:______

Exponential Growth and Decay Applications

1. In 1992, 1219 monk parakeets were observed in the United States. For the next 11 years, about 12% more parakeets were observed each year.

a) Estimate the number of parakeets in 2000.

b) Estimate the year, in which there were about 6000 parakeets.

2. You purchase an antique table for $450. The value of the table increases by 6% per year.

a) Estimate the value of the table 5 years later.

b) Estimate how long it will take for the value to double.

3. In 1990, the population of Austin, Texas, was 494,490. During the next 10 years, the population increased by about 3% each year.

a) What was the population in 2000?

b) Estimate the year when the population was about 590,000

<u>For problems #4-7, find the final amount for each investment.</u>

4. You deposit $1300 earning 5% annual interest compounded annually for 10 years.

5. You deposit $300 earning 4.5% annual interest compounded quarterly for 3 years.

6. You deposit $2000 earning 2.75% annual interest compounded monthly for 6 years.

7. You deposit $5000 earning 3.5% annual interest compounded daily for 3 years.

8. A certain medication is eliminated from the bloodstream at a rate of about 12% per hour. The medication reaches a peak level in the bloodstream of 40 milligrams. Predict the amount, to the nearest tenth of a milligram, of medication remaining:

a) 3 hours after the peak level

b) 5 hours after the peak level

9. You buy a mountain bike for $500. The value of the bike decreases by 20% each year.

a) Estimate the value after 3 years.

b) Estimate when the value of the bike will be $100.

10. When will your investment double if you deposit $750 into an account that earns 6.5% interest compounded quarterly?

Alg. 2 Unit 11 Name:________________________________

Day 4 Worksheet – Use Functions Involving e Date:____________________Period:______

Simplify the natural base expressions.

1. $e^4 \bullet e^{-2}$

2. $\dfrac{12e^7}{3e^4}$

3. $\left(2xe^5\right)^2$

4. $\dfrac{e^4}{2e^{-3}}$

5. $\dfrac{\left(3e^2\right)^3}{7e^5}$

Use a calculator to evaluate the expression. Round to 3 decimals.

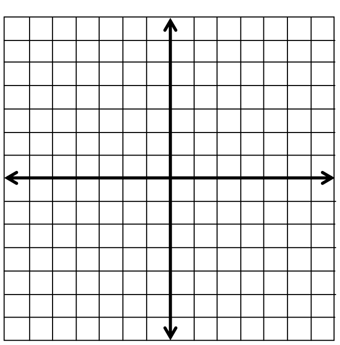
6. $2e^{-1}$

7. $e^{\frac{3}{5}}$

8. $e^{(\pi)}$

Graph the following natural base functions, then state the domain and range.

9. $y = e^x$



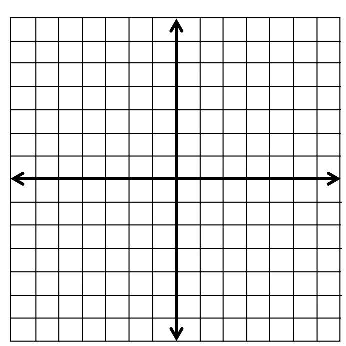
Domain:

Range:

Asym:

$(\mathbf{-1}$,________) ($\mathbf{0}$,_________) ($\mathbf{1}$,________)

10. $y = 2e^{-0.2x}$



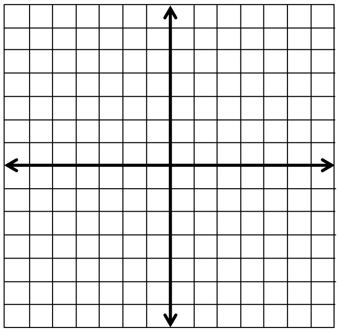
Domain:

Range:

Asym:

$(\mathbf{-1}$,________) ($\mathbf{0}$,_________) ($\mathbf{1}$,________)

11. $y = e^{(x+1)} - 3$



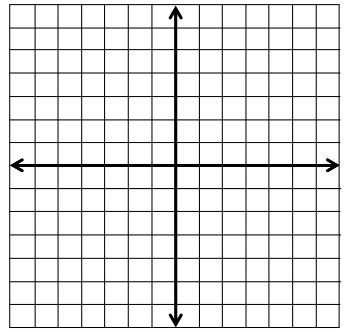
Domain:

Range:

Asym:

(−1, ________) (**0**, _________) (**1**, ________)

12. $f(x) = e^{-0.25x} + 2$



Domain:

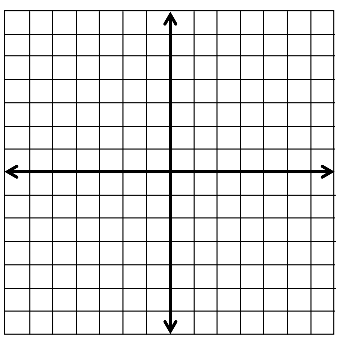
Range:

Asym:

(−1, ________) (**0**, _________) (**1**, ________)

Mixed Review:

13. $y = -2(3)^x + 2$



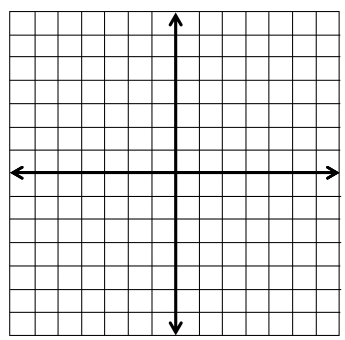
Domain:

Range:

Asym:

(−1, ________) (**0**, _________) (**1**, ________)

14. $f(x) = \left(\frac{2}{5}\right)^{x+1}$



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Asym:

(−1, ________) (**0**, _________) (**1**, ________)

COMPOUND INTEREST FORMULA $A = P\left(1 + \frac{r}{n}\right)^{nt}$

15. BW, being fiscally aware, knows that saving money early can produce decent returns. So he decides to place a $5000 grade bribe into a savings account that pays 2.9% annual interest. Find the balance of his account after 12 years (because that is the projected retirement date), assuming that the interest is compounded monthly.

Alg. 2 Unit 11 Name:________________________________

Day 5 Worksheet – Application of Growth and Decay Date:____________________Period:______

1. You deposit $4000 in an account that pays 6% annual interest compounded continuously.

a) What is the balance after 1 year?

b) 5 years?

c) How long will it take to have $10,000 in your account? (table/graph)

2. The number of camera phones shipped globally can be modeled by the function $y = 1.26e^{1.31x}$ where *x* is the number of years since 1997 and *y* is the number of camera phones shipped (in millions). How many camera phones were shipped in 2002?

3. Scientist used traps to study the Formosan subterranean termite population in New Orleans. The mean number *y* of termites collected annually can be modeled by $y = 738e^{0.345t}$ where *t* is the number of years since 1989. What was the mean population of termites collected in 1999?

4. You deposit $800 in an account that pays 2.65% annual interest compounded continuously.

a) What is the balance after 12 years?

b) How much would you have to deposit to have $1650 in my account over the same time period?

5. In the general growth function $y = 600(1.65)^{.5}$, what is the interest rate?

6. Mr. Mortara has had a ferocious problem with ants in his back yard, so he has decided to study them. He has found that he has an initial population of 4,322 ants and that the ant population is growing at a daily rate of 2%. If left untouched what will be the population in 2 years?

7. Mr. Worthen got a little too crazy on his skateboard and took a major digger! The wound on his arm was disgusting. Being the math nerd that he is, he came up with a math model to represent the healing time of his wound. He found that the area of the wound decreases exponentially with time! The area *A* of a wound after *t* days can be modeled by $A = A_0e^{-0.05t}$ where A_0 is the initial area (size) of the disgusting wound. If the initial size of Mr. Worthen's bloody wound is 4 square centimeters, what is the area of the wound after 14 days?

8. You deposit $1500 in an account that pays 7% annual interest compounded *daily*. Find the balance after 2 years.

9. You buy a new personal computer for $1600. It is estimated that the computer's value will decrease by 50% each year. After about how many years will the computer be worth $250?

10. The population of the US is expected to increase by 0.9% each year from 2013-2024. The US population was about 290 million in 2013. To the nearest million, what is the projected population for 2020? (Multiple-choice)?

a) 295 million **b)** 309 million **c)** 574 million **d)** 4891 million

11. You deposit $1000 in an account that pays 3% annual interest. You let it sit for 2 years. What would be your balance if compounded monthly, semi-annually, or continuously? Which investment would you choose, show work to support your decision.

12. The model $y = 7.7e^{0.14x}$ gives the number of *y* (in thousands per cubic centimeter) of bacteria in a liquid culture after *x* hours. After how many hours will there be 50,000 bacteria per cubic centimeter? Round to nearest tenth.

13. A movie grosses $37 million in its first week of release. The weekly gross *y* decreases by 30% each week.

a) Write an exponential decay model for the weekly gross after *x* weeks.

b) What would be the gross after 4 weeks?