Acc. Geom/Algebra II

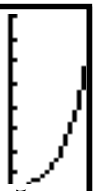
Name SOLUTIONS

Exponential Function Graphs & "e"

Period _____ Date _____

For each of the following functions, identify first whether it represents a type of "***exponential growth***" or "***exponential decay***". Then identify the ***y–intercept*** and the ***equation*** of the ***asymptote*** of the graph of the function. Also state the ***domain*** and ***range*** of the function, and sketch a ***graph***.

Example: $y = \frac{1}{4} \cdot 6^x$



"Growth" or "Decay"? *Exponential growth*

y–intercept: $\left(0, \frac{1}{4}\right)$

Equation of Asymptote: $y = 0$

Domain: *all Real numbers*

Range: $y > 0$

1.) $y = 11 \cdot 3^x$

"Growth" or "Decay"? *Exponential growth*

y–intercept: $(0, 11)$

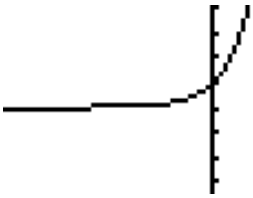
Equation of Asymptote: $y = 0$

Domain: *all Real numbers*

Range: $y > 0$

2.) $y = \left(\frac{1}{5}\right)^{-x} + 4$

$y = 5^x + 4$



"Growth" or "Decay"? *Exponential growth*

y–intercept: $(0, 5)$

Equation of Asymptote: $y = 4$

Domain: *all Real numbers*

Range: $y > 4$

3.) $y = 7 \cdot \left(\frac{3}{8}\right)^x - 1$

"Growth" or "Decay"? *Exponential decay*

y–intercept: $(0, 6)$

Equation of Asymptote: $y = -1$

Domain: *all Real numbers*

Range: $y > -1$

4.) $y = 2 \cdot e^x$

"Growth" or "Decay"? *Exponential growth*

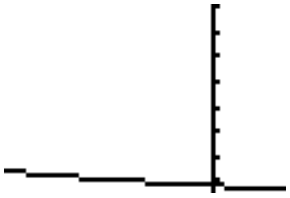
y–intercept: $(0, 2)$

Equation of Asymptote: $y = 0$

Domain: *all Real numbers*

Range: $y > 0$

5.) $y = \frac{5}{6} \cdot (0.9)^x$



"Growth" or "Decay"? *Exponential decay*

y–intercept: $\left(0, \frac{5}{6}\right)$

Equation of Asymptote: $y = 0$

Domain: *all Real numbers*

Range: $y > 0$

Continued on the back

Warren Buffett, smart investor that he is, invests $100 in an account that pays 100 % annual interest. How much money will he have in this account at the end of one year if:

a) the money is compounded annually. **$200.00**

b) the money is compounded quarterly. **$244.14**

c) the money is compounded monthly. **$261.30**

d) the money is compounded weekly. **$269.26**

e) the money is compounded daily. **$271.46**

f) the money is compounded hourly. **$271.81**

g) the money is compounded each minute. **$271.83**

h) What do these calculations have to do with the number "**e**"?

e = 2.718281828459

Given that the initial principal P deposited in a savings account that pays interest at an annual rate of r (expressed as a decimal), compounded n times per year for t years, can be modeled by the equation:

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

Simplify each of the following expressions **completely**. Leave answers in exact form – **do <u>not</u> give decimal approximations** for answers !

6.) $e^3 \cdot e^6$ **$= e^9$**

7.) $\dfrac{e^{-7x}}{e^{2x}}$ **$= \dfrac{1}{e^{9x}}$**

8.) $\left(4e^{-5}\right)^{-1}$ **$= \dfrac{e^5}{4}$**

9.) $\sqrt{16e^{2x}}$ **$= 4e^x$**

10.) $\dfrac{-3e^4}{e}$ **$= -3e^3$**

11.) $\left(\dfrac{2e^{-1}}{8e^{-9}}\right)^{\frac{1}{2}}$ **$= \dfrac{e^4}{2}$**

12.) $\dfrac{7e^x}{e^{7x}}$ **$= \dfrac{7}{e^{6x}}$**

13.) $\left(5e^{-2}\right)^3$ **$= \dfrac{125}{e^6}$**

14.) $\sqrt[3]{64e^{6x}}$ **$= 4e^{2x}$**

15.) $e^{3x} \cdot e^{2-3x}$ **$= e^2$**

16.) Write an exponential function in the form $y = a \cdot b^x$ that goes through the points (0,4) and (5,128).

$$y = 4 \cdot 2^x$$

17.) Write an exponential function in the form $y = a \cdot b^x$ that goes through the points (1,81) and (4,3).

$$y = 243 \cdot \left(\frac{1}{3}\right)^x$$