**Derivatives of Exponential Functions**

Find the derivative of each of the following functions.

1.  2.  3. 

4.  5.  6. 

7.  8.  where A and c are constants.

9.  10.  11. 

12. The voltage drop across a component of an electric circuit is given by the function

 where V(t) is measured in volts and t is time in seconds.

A) What is the voltage drop and how fast is it changing when t = 1 second?

B) Graph V(t). What happens to the voltage drop in the long run?

13. In example 1 we derived a model for the population of FL as a function of time in years since 1990. The function was .

A) What does this model predict for the population of FL in the year 2000 and its rate of change?

B) What does P(11) – P(10) mean in context? How does it compare with the answer in part A.

C) On the graph of P(t) show the values calculated in parts A and B.

14. The graph of  has a horizontal tangent line at what value of x? What is special about the graph at that point?

15. Suppose that a culture of bacteria grows in such a way that it starts with 100 bacteria doubles every three hours. Write a function that gives the number of bacteria as a function of time. What does the function predict will be the number of bacteria after 30 hours and at what rate will it be growing?

Answers:

1. a) ; b) approaches 10.
2. A) 18.8, 0.56; B) The average rate of change in the population between 2000 and 2001. It is approximately the same.
3. *x* = 1. It has a turning point there.

More derivative practice:

Find the derivatives of the following functions.

|  |  |
| --- | --- |
| 1. | 11. |
| 2. | 12. |
| 3. | 13. |
| 4. | 14. |
| 5. | 15. |
| 6. | 16. |
| 7. | 17. |
| 8. | 18. |
| 9. | 19. |
| 10. | 20. |

Answers toMore derivative practice:

|  |  |
| --- | --- |
| 1. | 11. |
| 2. | 12. |
| 3. | 13. |
| 4. | 14. |
| 5. | 15. |
| 6. | 16. |
| 7. | 17. |
| 8. | 18. |
| 9. | 19. |
| 10. | 20. |