**FUNDAMENTAL DIFFERENTIAL EQUATIONS.**

**Find the “*particular solutions”* of the following differential equations.**

1.  = *4x3* given *x = 1 when y = 3*

2.  =  given *x = 4 when y = 1*

3.  =  given *x = 6 when y = 1*

4.  =  given *x = 3 when y = 1*

5.  =  given *x = 7 when y = 4*

6.  = 6 given *x = 1 when y = 8*

7. ** = *y* given *x = 6 when y = 1***

8. ***dy = 4y given x = 3 when y = 1***

***dx***

9*.* ***dy = 5y given x = 0 when y = 7***

***dx***

10. ***dy = 2y given x = 6 when y = 4***

***dx***

11. The rate of increase of lice on a sheep is proportional to the number already present. Write this as a differential equation.

If N = 20 at t = 0 and  
N = 50 at t = 3 days, find a formula for N at t days.

Find the number at t = 14 days.

Find how long it will take for the number to exceed 1000 lice at this rate.

**TESTING SOLUTIONS:**

1. If ***y =*** ***ex*** find and  then show by substitution that ***y = ex*** is a solution of

the differential equation 3+ 4 = 7y

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| --- | --- |
| Lhs = 3+ 4  = | Rhs = 7y  = |

2. If *y* = cos *x* find and  and show that *y* = cos *x* is a solution of the differential equation ** + *y* =  + sin *x***

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| Lhs =  = | Rhs =  = |

3 . Show that ***y = Aebx*** is a solution of  **= *b* *y***

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|  |  |
| --- | --- |
| Lhs =  = | Rhs =  = |