

**Math 122**  
**Quiz 4 Review**

1. Verify that  $y = \frac{x^4}{16}$  is a solution of the differential equation

$$\frac{dy}{dx} = xy^{1/2}$$

2. Verify that  $y = x^2 + 2x + 2 + Ce^x$  is a solution of the differential equation

$$y' - y + x^2 = 0$$

3. Sketch the slope field for  $\frac{dy}{dx} = x(6 - y)$  and draw the solution that goes through  $(0, 0)$ .

4. Sketch the slope field for  $\frac{dy}{dx} = xy$  and draw the solution that goes through  $(0, 1)$ .

5. Find the general solution of  $\frac{dy}{dx} = (x + 1)^2$

6. Find the general solution of  $y' = \frac{3x^3}{1 + x^2}$

7. Find the general solution of  $\frac{dy}{dx} = \frac{7}{y}$

8. Solve  $\frac{dy}{dx} = 1 + y$        $y(0) = 5$

9. Solve  $\frac{dy}{dx} = y^{2/3}$        $y(0) = 8$

10. Solve  $\frac{dy}{dx} = y$        $y(0) = 3$

11. Suppose an experimental population of fruit flies increases according to the law of exponential growth. there were 100 flies after the second day of the experiment and 300 flies after the fourth day. Approximately how many flies were in the original population?

12. Write a differential equation that models the rate of change of  $Q$  with respect to  $t$  is inversely proportional to the square of  $t$ .

Use Euler's method:

13.  $\frac{dy}{dx} = y$        $y(0) = 1$  find  $y(1)$  with  $h = 0.1$

14.  $\frac{dy}{dx} = 2y - 1$        $y(0) = 1$  find  $y(1)$  with  $h = 0.1$

15.  $\frac{dy}{dx} = 1 - x + 4y$        $y(0) = 1$  find  $y(1)$  with  $h = 0.1$

16.  $\frac{dy}{dx} = 2xy$        $y(1) = 1$  find  $y(1.5)$  with  $h = 0.1$

17.  $\frac{dy}{dx} = (x + y - 1)^2$        $y(0) = 2$  find  $y(0.5)$  with  $h = 0.1$

18.  $\frac{dy}{dx} = (x + y - 1)^2$        $y(0) = 2$  find  $y(0.5)$  with  $h = 0.05$

19.  $\frac{dy}{dx} = x + xy$        $y(0) = 1$  find  $y(1)$  with  $h = 0.25$

Answers

5.  $y = \frac{(x+1)^3}{3} + C$

6.  $y = \frac{3}{2}x - \frac{3}{2}\ln|1+x^2| + C$

7.  $y = \pm\sqrt{14x+C}$

8.  $y = 6e^x - 1$

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

10.  $y = 3e^x$

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12.  $\frac{dQ}{dt} = \frac{k}{t^2}$

13.  $y(1) = 2.5937$

14.  $y(1) = 8.7876$

15.  $y(1) = 34.4115$

16.  $y(1.5) = 3.2206$

17.  $y(0.5) = 3.2261$

18.  $y(0.5) = 3.4823$

19.  $y(1) = 1.839$