

**Math 260**  
**Practice Sheet for Chapter 1**

*Solve the Differential Equations (in Questions 1-10). In case of Initial Value Problems, find the particular solution.*

1)  $\frac{dy}{dx} = \frac{\cos x}{y}$ ;  $y(0) = -1$

Answer:  $y(x) = -\sqrt{2 \sin x + 1}$

2)  $\frac{dy}{dx} = ye^x - 2e^x + y - 2$

Answer:  $y(x) = Ce^{e^x+x} + 2$

3)  $\frac{dx}{dt} = x \tan t + \sin t$ ;  $x(0) = 2$

Answer:  $x(t) = -\frac{\cos t}{2} + \frac{5}{2 \cos t}$

4)  $(x + ye^y) \frac{dy}{dx} = 1$

Answer:  $x(y) = e^y \left( C + \frac{y^2}{2} \right)$

5)  $x \frac{dy}{dx} + y = x^4 y^3$

Answer:  $y^{-2} = Cx^2 - x^4$

6)  $(x + y)dx + (y - x)dy = 0$

Answer:  $\frac{-1}{2} \ln \left( \frac{x^2 + y^2}{x^2} \right) + \tan^{-1} \left( \frac{y}{x} \right) - \ln x = C$

7)  $(y + 2xe^{-y/x})dx - xdy = 0$

Answer:  $y(x) = x \ln(C + 2 \ln x)$

8)  $\frac{x}{\sqrt{x^2 + y^2}} dx + \frac{y}{\sqrt{x^2 + y^2}} dy = 0$

Answer:  $\sqrt{x^2 + y^2} = C$

9)  $e^y dx + (xe^y - \sin y) dy = 0$

Answer:  $xe^y + \cos y = C$

10) Is  $-ydx + xdy = 0$  exact? Solve this equation.

Answer:  $\ln\left(\frac{y}{x}\right) = C$

11) The initial temperature of a laban bottle is  $28^\circ C$ . You put it in your refrigerator having temperature  $4^\circ C$  inside. In 15 minutes you measure the temperature of laban bottle and find that it is  $22^\circ C$ . How long do you have to wait so that the temperature of laban bottle is  $10^\circ C$  (and you can have a cool drink!!)?

Answer: 1.2 hrs

12) The initial population of a residential compound (owned by you) was 500. It has increased by 15% in 10 years. What will be the population of compound in further 20 years?

Answer: 760

**End of practice sheet.**

**Try to solve all the questions yourself. If you have problems, feel free to come and discuss in my office hours or other fixed time.**

**Remember: you will be able to understand better, if you have tried yourself before asking me.**