First Course in Differential Equations with Modeling Applications 10th Edition Zill Test Bank

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Chapter 01 Form D: INTRODUCTION TO DIFFERENTIAL EQUATIONS

MULTIPLE CHOICE

- 1. The differential equation y'' + 2y'' + 3y' + 7y = 0 is Select the correct answer.
 - a. first order linear
 - b. second order linear
 - c. third order linear
 - d. first order nonlinear
 - e. second order nonlinear

ANS: C PTS: 1

- 2. The differential equation y'' + 2yy' + 3y = 0 is Select the correct answer.
 - a. first order linear
 - b. second order linear
 - c. third order linear
 - d. first order nonlinear
 - e. second order nonlinear

ANS: E PTS: 1

- 3. The differential equation $y' + 3y = \sin x$ is Select the correct answer.
 - a. first order linear
 - b. second order linear
 - c. third order linear
 - d. first order nonlinear
 - e. second order nonlinear

ANS: A PTS: 1

- 4. The differential equation $y'' + 2y' + 3y = \sin y$ is Select the correct answer.
 - a. first order linear
 - b. second order linear
 - c. third order linear
 - d. first order nonlinear
 - e. second order nonlinear

ANS: E PTS: 1

5. The differential equation $y''' + 2y'' + 3xy' - 4e^x y = \sin x$ is

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Select the correct answer.

- a. first order linear
- b. second order linear
- c. third order linear
- d. first order nonlinear
- e. second order nonlinear

ANS: C PTS: 1

- 6. The values of *m* for which $y = e^{mx}$ is a solution of y'' 9y' + 20y = 0 are Select the correct answer.
 - a. 4 and -5 b. -4 and -5 c. 3 and 6 d. 4 and 5 e. 3 and 5 ANS: D PTS: 1
- 7. The values of *m* for which $y = x^m$ is a solution of $x^2y'' 7xy' + 12y = 0$ are Select the correct answer.
 - a. -3 and 4 b. -2 and -6 c. 3 and 4 d. 2 and 6 e. 3 and -4 ANS: A PTS: 1
- 8. The values of c for which y = c is a constant solution of $y' = y^2 + 5y 6$ are Select the correct answer.
 - a. 1 and 6
 b. -1 and 6
 c. 1 and -6
 d. -2 and 3
 e. 2 and 3
 ANS: C PTS: 1
- 9. The values of *m* for which $y = e^{mx}$ is a solution of y'' 6y' 7y = 0 are Select the correct answer.
 - a. 1 and 7
 b. -1 and 6
 c. 1 and 6
 d. 1 and -6

e. -1 and 7 ANS: E PTS: 1

10. The population of a town increases at a rate proportional to its population. Its initial population is 5000. The correct initial value problem for the population, P(t), as a function of time, *t*, is

Select the correct answer.

a.
$$\frac{dP}{dt} = kP, P(0) = 5000$$

b. $\frac{dP}{dt} = kP^2, P(0) = 500$
c. $\frac{dP}{dt} = kP, P(0) = 500$
d. $\frac{dP}{dt} = kP(1-P), P(0) = 5000$
e. $\frac{dP}{dt} = kP^2, P(0) = 5000$
ANS: A PTS: 1

- 11. The solution of the initial value problem y' = 5y, y(1) = 3 is $y = ce^{5x}$, where c = Select the correct answer.
 - a. $3e^{-5}$ b. 3 c. $3e^{5}$ d. $-3e^{5}$ e. -3ANS: A PTS: 1
- 12. The solution of the initial value problem y' = 2y + x, y(-1) = 1/2 is $y = -x/2 1/4 + ce^{2x}$, where c = Select the correct answer.
 - a. 2 b. $e^2/4$ c. e^2 d. $e^2/2$ e. 1 ANS: B PTS: 1
- 13. The initial value problem $y' = \sqrt{y^2 16}$, $y(x_0) = y_0$ has a unique solution guaranteed by Theorem 1.1 if Select the correct answer.

a.	$y_0 = 4$		
b.	$y_0 = -4$		
c.	$y_0 = 0$		
d.	$y_0 = 8$		
e.	$y_0 = 1$		
AN	VS: D	PTS:	1

14. The temperature of a cup of coffee obeys Newton's law of cooling. The initial temperature of the coffee is140°F and one minute later, it is 125°F. The ambient temperature of the room is 65°F. If T(t) represents the temperature of the coffee at time *t*, the correct differential equation for the temperature is Select the correct answer.

a.
$$\frac{dT}{dt} = k(T-125)$$

b.
$$\frac{dT}{dt} = k(T-140)$$

c.
$$\frac{dT}{dt} = k(T-65)$$

d.
$$\frac{dT}{dt} = T(T-140)$$

e.
$$\frac{dT}{dt} = T(T-65)$$

ANS: C PTS: 1

15. In the previous problem, after a long period of time, the temperature of the coffee approaches

Select the correct answer.

a.	125°F	
b.	100°F	
c.	65°F	
d.	50°F	
e.	0°F	
AN	IS: C	PTS:

16. In the *LRC* circuit problem in the text, *R* stands for Select the correct answer.

1

- a. capacitance
- b. resistance
- c. current
- d. inductance
- e. charge on the capacitor

ANS: B PTS: 1

17. A large mixing tank initially contains 1000 gallons of water in which 40 pounds of salt have been dissolved. Another brine solution is pumped into the tank at the rate of 5 gallons per minute, and the resulting mixture is pumped out at the same rate. The concentration of the incoming brine solution is 3 pounds of salt per gallon. If A(t) represents the amount of salt in the tank at time *t*, the correct differential equation for *A* is Select the correct answer.

a.
$$\frac{dA}{dt} = 3 - .005A$$

b.
$$\frac{dA}{dt} = 5 - .05A$$

c.
$$\frac{dA}{dt} = 15 - .005A$$

d.
$$\frac{dA}{dt} = 3 - .05A$$

e.
$$\frac{dA}{dt} = 15 + .05A$$

ANS: C PTS: 1

18. In the previous problem, over a long period of time, the total amount of salt in the tank will approach

Select the correct answer.

- a. 300 pounds b. 500 pounds c. 1000 pounds d. 3000 pounds e. 5000 pounds ANS: D PTS: 1
- 19. In the LRC circuit problem in the text, the units for C, are Select the correct answer.
 - a. ohms
 - b. farads
 - c. amperes
 - d. henrys
 - e. coulombs

ANS: B PTS: 1

- 20. In the falling body problem, the units of acceleration might be Select the correct answer.
 - a. centimeters per second
 - b. feet per second
 - c. feet per second per second
 - d. kilograms per centimeter

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e. kilograms per centimeter per second

ANS: C PTS: 1