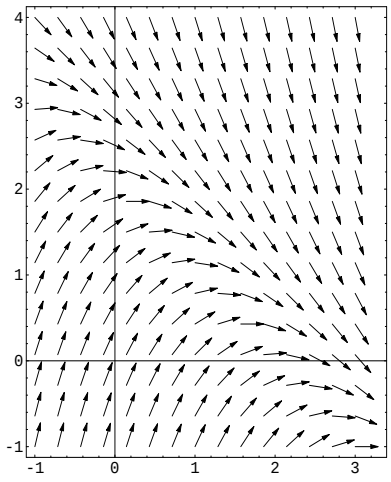



1. The graph shows a direction field for the differential equation $y' = 2 - x - y$ for $-1 < x < 3$, $-1 < y < 4$. Sketch by hand the approximate solution curves that pass through the points $(1, 2)$, $(0, 0)$, and $(2, 3)$.

2. By hand, sketch isoclines for the differential equation $y' = x - y$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(0) = 1$.

3. Solve the differential equation $xy' = 2y$.

4. Solve the differential equation $y' = xe^y$.

5. Solve the differential equation $y' = (x + 1)(y^2 - 1)$.

6. Solve the differential equation $3y' + 6y = 2x$.

7. Solve the differential equation $x^2y' + xy = 2$.

8. Solve the differential equation $\cos x\ y' + \sin x\ y = 1$.

9. Solve the differential equation $(2x + y)dx + (x + 2y)dy = 0$.

10. Solve the differential equation $(\tan x - \sin x\ \sin y)dx + \cos x\ \cos y\ dy = 0$.

11. Solve the differential equation $(x^3 + y^3)dx + 3xy^2dy = 0$.

12. Solve the differential equation $2xyy' + 2y^2 + 3x = 0$ by finding an appropriate integrating factor.

13. Solve the differential equation $xdx + (y - 2x)dy = 0$ by using an appropriate substitution.

14. Solve the differential equation $xy' - y = 2x^2y^2$, by using an appropriate substitution.

15. Solve the differential equation $y' = (2x+2y-1)^2$, by using an appropriate substitution.

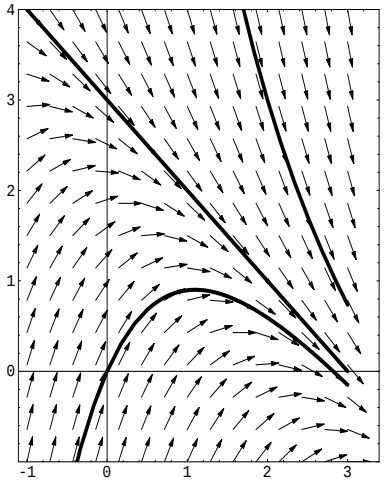
16. Use Euler's method with $h = 0.1$ to obtain an approximation of $y(.2)$ for the initial value problem $y' = x^2 + y^2$, $y(0) = 2$.

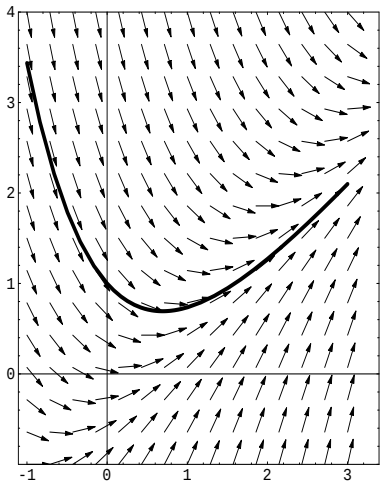
17. Use Euler's method with $h = 0.1$ to obtain an approximation of $y(.2)$ for the initial value problem $y' = y$, $y(0) = 1$.

18. Solve the initial value problem $y' = x + 2y$, $y(0) = 3$.

19. Solve the initial value problem $y' = x(x+1)e^y$, $y(0) = 2$.

20. Solve the initial value problem $(x+y)^2dx + (1+2xy+x^2)dy = 0$, $y(0) = 1$.

1. 


2. 


3. $y = cx^2$

4. $y = -\ln(c - x^2/2)$

5. $\frac{y-1}{y+1} = ce^{x^2+2x}$ or $y = \frac{1+ce^{x^2+2x}}{1-ce^{x^2+2x}}$

6. $y = x/3 - 1/6 + ce^{-2x}$

7. $y = (2\ln x + c)/x$

8. $y = \sin x + c\ \cos x$

9. $x^2 + xy + y^2 = c$

10. $-\ln(\cos x) + \cos x\ \sin y = c$

11. $x^4/4 + xy^3 = c$

12. integrating factor $= x$, $y^2 = -x + c/x^2$

13. $\ln(y - x) - x/(y - x) = c$

14. $y = x/(c - 2x^3/3)$

15. $2x + 2y - 1 = \tan(2y + c)$

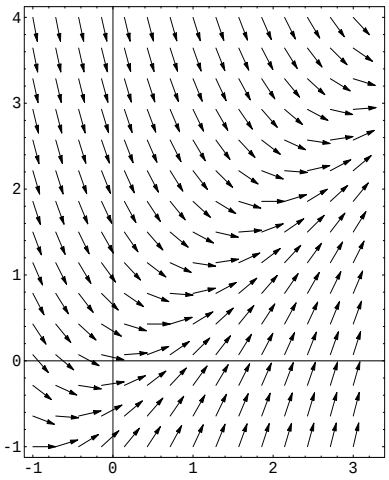
16. 2.977

17. 1.21

18. $y = -x/2 - 1/4 + 13e^{2x}/4$

19. $y = -\ln(e^{-2} - x^3/3 - x^2/2)$

20. $(x + y)^3/3 + y - y^3/3 = 1$




1. The graph shows a direction field for the differential equation $y' = x - y$ for $-1 < x < 3$, $-1 < y < 4$. Sketch by hand the approximate solution curves that pass through the points $(1, 1)$, $(2, 1)$, and $(2.5, -.32)$.

2. By hand, sketch isoclines for the differential equation $y' = 2x - y$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(0) = 1$.

3. Solve the differential equation $xy' = 3y + 3$.

4. Solve the differential equation $y' = e^{x-y}$.

5. Solve the differential equation $y' = (x + 1)y(y + 1)$.

6. Solve the differential equation $y' + 4y = x$.

7. Solve the differential equation $x^2y' + 3xy = 4$.

8. Solve the differential equation $\sin x\ y' - \cos x\ y = 1$.

9. Solve the differential equation $(3x + 2y)dx + (2x + 3y)dy = 0$.

10. Solve the differential equation $(\tan x - \cos x\ \cos y)dx + \sin x\ \sin y\ dy = 0$.

11. Solve the differential equation $(x^2 + y^2)dx + 2xydy = 0$.

12. Solve the differential equation $xy + (x^2 + 2y + 1)y' = 0$ by finding an appropriate integrating factor.

13. Solve the differential equation $(x^2 - y^2)dx + 2xydy = 0$ by using an appropriate substitution.

14. Solve the differential equation $xy' - y = 3xy^{-1}$, by using an appropriate substitution.

15. Solve the differential equation $y' = (4x+4y-5)^2$, by using an appropriate substitution.

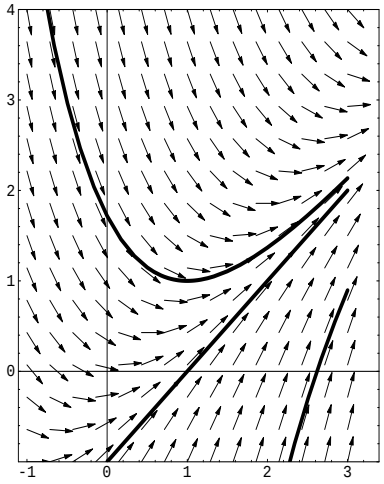
16. Use Euler's method with $h = 0.1$ to obtain an approximation of $y(.2)$ for the initial value problem $y' = x + y^2$, $y(0) = 2$.

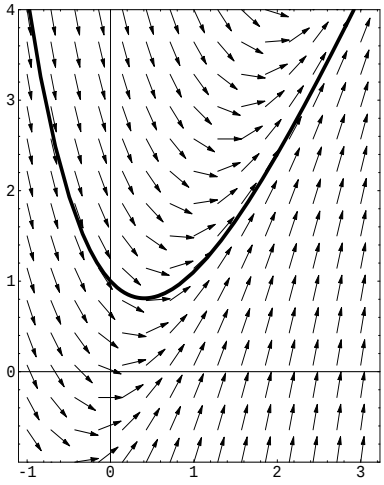
17. Use Euler's method with $h = 0.1$ to obtain an approximation of $y(.2)$ for the initial value problem $y' = xy$, $y(0) = 1$.

18. Solve the initial value problem $y' + 3y = 2x$, $y(0) = 1$.

19. Solve the initial value problem $y' = xy \sin x$, $y(0) = 2$.

20. Solve the initial value problem $xdy + (y - 3x^2 - e^x)dx = 0$, $y(1) = 2$.

1. 


2. 


3. $y = -1 + cx^3$
4. $y = \ln(e^x + c)$
5. $y/(y+1) = ce^{x^2/2+x}$ or $y = ce^{x^2/2+x}/(1 - ce^{x^2/2+x})$
6. $y = x/4 - 1/16 + ce^{-4x}$
7. $y = 2/x + c/x^3$
8. $y = -\cos x + c \sin x$
9. $3x^2 + 4xy + 3y^2 = c$
10. $\ln(\cos x) + \sin x \ \cos y = c$
11. $x^3/3 + xy^2 = c$
12. integrating factor $= y$, $x^2y^2/2 + 2y^3/3 + y^2/2 = c$
13. $(x^2 + y^2)/x = c$
14. $y^2 = -6x + cx^2$

15. $4x + 4y - 5 = \tan(4x + c)$

16. 2.986

17. 1.01

18. $y = 2x/3 - 2/9 + 11e^{-3x}/9$

19. $y = 2e^{-x\cos x + \sin x}$

20. $xy - x^3 - e^x = 1 - e$

1. If $a > 0$ and $b > 0$, the autonomous differential equation $\frac{dP}{dt} = P(a - bP)$ has a solution that is

   Select the correct answer.

   (a) increasing everywhere
   (b) decreasing everywhere
   (c) increasing if $0 < P < a/b$
   (d) decreasing if $0 < P < a/b$
   (e) increasing if $P > a/b$

2. The autonomous differential equation $\frac{dx}{dt} = x(x - 1)(x + 1)$ has a solution that is

   Select the correct answer.

   (a) increasing everywhere
   (b) decreasing everywhere
   (c) increasing if $0 < x < 1$
   (d) decreasing if $-1 < x < 0$
   (e) increasing if $x > 1$

3. In the autonomous differential equation $\frac{dx}{dt} = x(1 - x)$, the critical point

   Select the correct answer.

   (a) $x = 0$ is an attractor
   (b) $x = 0$ is semistable
   (c) $x = 1$ is an attractor
   (d) $x = 1$ is a repeller
   (e) $x = 1$ is semistable

4. The differential equation $(x^2 + y^2)y' = xy$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

5. The differential equation $y' = xe^y/y$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

6. The differential equation $xy' = 2y + \sin x$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

7. The solution of the differential equation $y' = xy$ is

   Select the correct answer.

   (a) $y = ce^x$
   (b) $y = ce^{x^2}$
   (c) $y = c + e^x$
   (d) $y = ce^{x^2/2}$
   (e) $y = c + e^{x^2/2}$

8. The solution of the differential equation $y' - y = x$ is

   Select the correct answer.

   (a) $y = x - 1 + ce^{-x}$
   (b) $y = x^2/2 + e^x$
   (c) $y = x^2/2 + e^{-x}$
   (d) $y = x - 1 + ce^x$
   (e) $y = -x - 1 + ce^x$

9. An integrating factor for the linear differential equation $xy' + y = x$ is
   Select the correct answer.

   (a) 0
   (b) 1
   (c) $x$
   (d) $1/x$
   (e) $e^x$

10. An integrating factor for the linear differential equation $y' - y/x = x$ is
    Select the correct answer.

    (a) $x$
    (b) $x^2$
    (c) $1/x$
    (d) $1/x^2$
    (e) $e^{-x}$

11. The differential equation $2xydx + (x^2 + 1)dy = 0$ is
    Select the correct answer.

    (a) exact with solution $x^2y + y + c$
    (b) exact with solution $x^2y + y = c$
    (c) exact with solution $2xy + y + c$
    (d) exact with solution $2xy + y = c$
    (e) not exact

12. The differential equation $xydx + (x^2 + y^2)dy = 0$ is
    Select the correct answer.

    (a) exact with solution $x^2y/2 + y^3/3 = c$
    (b) exact with solution $x^2y/2 + y^2/2 = c$
    (c) exact with solution $x^2y/2 + y^3/3 + c$
    (d) not exact but having an integrating factor $x$
    (e) not exact but having an integrating factor $y$

13. The differential equation $(x + 2y)dx + ydy = 0$ can be solved using the substitution
Select the correct answer.

    (a) $u = x + 2y$
    (b) $u = y$
    (c) $u = xy$
    (d) $u = y/x$
    (e) it cannot be solved using a substitution

14. The solution of $(x + 2y)dx + ydy = 0$ is
Select the correct answer.

    (a) $\ln x + \ln(y + x) = c$
    (b) $\ln((y + x)/x) = c$
    (c) $\ln(y + x) + x/(y + x) = c$
    (d) $\ln(y + x) + x/(y + x) + c$
    (e) it cannot be solved

15. The differential equation $y' - y/x = y^2$ can be solved using the substitution
Select the correct answer.

    (a) $u = y$
    (b) $u = y^2$
    (c) $u = y^3$
    (d) $u = y^{-1}$
    (e) $u = y^{-2}$

16. The solution of the differential equation $y' - y/x = y^2$ is
Select the correct answer.

    (a) $y = c/x - x/2$
    (b) $y = 1/(c/x - x/2)$
    (c) $y = (cx - x\ln x)$
    (d) $y = 1/(cx - x\ln x)$
    (e) $y = 1 + ce^x$

17. The differential equation $y' = (4x + 2y + 3)^2$ has the solution
    Select the correct answer.

    (a) $y = -(4x + 3)^3/12 + c$
    (b) $y = (4x + 2y + 3)^3/12 + c$
    (c) $y = (4x + 2y + 3)^3/3 + c$
    (d) $y = \sqrt{2}\tan(2\sqrt{2}x + c)$
    (e) $4x + 2y + 3 = \sqrt{2}\tan(2\sqrt{2}x + c)$

18. The differential equation $y' = \sqrt{x + y + 1} - 1$ has the solution
    Select the correct answer.

    (a) $y = ((x + c)/2)^2$
    (b) $y = 2(x + y + 1)^{3/2}/3 + c$
    (c) $x + y + 1 = ((x + c)/2)^2$
    (d) $y = 2(x + y + 1)^{3/2}/3 - x + c$
    (e) $x + y = ((x + c)/2)^2$

19. Solve the problem $y' = (x + 1)y$, $y(0) = 1$ numerically for $y(0.2)$ using $h = 0.1$.
    Select the correct answer.

    (a) 1.1
    (b) 1.11
    (c) 1.2
    (d) 1.21
    (e) 1.221

20. Solve the problem $y' = x^2y^2$, $y(0) = 1$ numerically for $y(0.2)$ using $h = 0.1$
    Select the correct answer.

    (a) 1.0
    (b) 1.001
    (c) 1.01
    (d) 1.02
    (e) 1.002

**ANSWER KEY**
***Zill Differential Equations 9e Chapter 2 Form C***

1. c
2. e
3. c
4. b
5. c
6. a
7. d
8. e
9. b
10. c
11. b
12. e
13. d
14. c
15. d
16. b
17. e
18. c
19. e
20. b

1. Assume that $a > 0$, $b > 0$. The autonomous differential equation $\frac{dP}{dt} = P(a + bP)$ has a solution that is

   Select the correct answer.

   (a) increasing everywhere
   (b) decreasing everywhere
   (c) increasing if $-a/b < P < 0$
   (d) decreasing if $-a/b < P < 0$
   (e) decreasing if $P < -a/b$

2. The autonomous differential equation $\frac{dx}{dt} = x^2(x - 4)$ has a solution that is

   Select the correct answer.

   (a) increasing everywhere
   (b) decreasing everywhere
   (c) increasing if $0 < x < 4$
   (d) decreasing if $x > 4$
   (e) increasing if $x > 4$

3. In the autonomous differential equation $\frac{dx}{dt} = x^2(1 - x)$, the critical point

   Select the correct answer.

   (a) $x = 0$ is an attractor
   (b) $x = 0$ is a repeller
   (c) $x = 1$ is an attractor
   (d) $x = 1$ is a repeller
   (e) $x = 1$ is semistable

4. The differential equation $2xydx + (x^2 + y^3)dy = 0$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

5. The differential equation $y' + y = xy^2$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

6. The differential equation $x^2y' = 2xy + \cos x$ is

   Select the correct answer.

   (a) linear
   (b) homogeneous
   (c) separable
   (d) exact
   (e) Bernoulli

7. The solution of the differential equation $y' = x^2y$ is

   Select the correct answer.

   (a) $y = ce^{x^2}$
   (b) $y = ce^{x^3}$
   (c) $y = c + e^{x^2}$
   (d) $y = ce^{x^3/3}$
   (e) $y = c + e^{x^3/3}$

8. The solution of the differential equation $y' + y = x$ is

   Select the correct answer.

   (a) $y = x - 1 + ce^{-x}$
   (b) $y = x^2/2 + e^x$
   (c) $y = x^2/2 + e^{-x}$
   (d) $y = x - 1 + ce^x$
   (e) $y = -x - 1 + ce^x$

9. An integrating factor for the linear differential equation $x^2y' + xy = 1$ is
Select the correct answer.

   (a) 0
   (b) 1
   (c) $x$
   (d) $1/x$
   (e) $e^x$

10. An integrating factor for the linear differential equation $y' + y/x = x$ is
Select the correct answer.

   (a) $1/x$
   (b) $x$
   (c) $1/x^2$
   (d) $x^2$
   (e) $e^{-x}$

11. The differential equation $(y^3 + 6xy^4)dx + (3xy^2 + 12x^2y^3)dy = 0$ is
Select the correct answer.

   (a) exact with solution $y^4/4 + 6xy^5/5 + 3x^2y^2/2 + 4x^3y^3 + c$
   (b) exact with solution $y^4/4 + 6xy^5/5 + 3x^2y^2/2 + 4x^3y^3 = c$
   (c) exact with solution $xy^3 + 3x^2y^4 = c$
   (d) exact with solution $xy^3 + 3x^2y^4 + c$
   (e) not exact

12. The differential equation $(-xy\sin x + 2y\cos x)dx + 2x\cos x dy = 0$ is
Select the correct answer.

   (a) exact with solution $-xy\cos x + y\sin x + 2xy\cos x = c$
   (b) exact with solution $-xy\cos x + y\sin x + 2xy\cos x + c$
   (c) exact with solution $-2xy\cos x + y\sin x + 2xy\cos x = c$
   (d) not exact but having an integrating factor $xy$
   (e) not exact but having an integrating factor $y$

13. The differential equation $(x - 2y)dx + ydy = 0$ can be solved using the substitution
Select the correct answer.

    (a) $u = xy$
    (b) $u = y/x$
    (c) $u = x - 2y$
    (d) $u = y$
    (e) it cannot be solved using a substitution

14. The solution of $(x - 2y)dx + ydy = 0$ is
Select the correct answer.

    (a) $\ln(y - x) - x/(y - x) = c$
    (b) $\ln(y - x) - x/(y - x) + c$
    (c) $\ln x + \ln(y - x) = c$
    (d) $\ln((y - x)/x) = c$
    (e) it cannot be solved

15. The differential equation $y' + y/x = y^2$ can be solved using the substitution
Select the correct answer.

    (a) $u = y$
    (b) $u = y^2$
    (c) $u = y^3$
    (d) $u = y^{-1}$
    (e) $u = y^{-2}$

16. The solution of the differential equation $y' + y/x = y^2$ is
Select the correct answer.

    (a) $y = c/x - x/2$
    (b) $y = 1/(c/x - x/2)$
    (c) $y = (cx - x\ln x)$
    (d) $y = 1/(cx - x\ln x)$
    (e) $y = 1 + ce^x$

17. The differential equation $y' = (2x + 4y + 5)^2$ has the solution
    Select the correct answer.

    (a) $y = -(2x + 3)^3/6 + c$
    (b) $y = (2x + 4y + 5)^3/6 + c$
    (c) $y = (2x + 4y + 5)^3/3 + c$
    (d) $y = \tan(2\sqrt{2}x + c)/\sqrt{2}$
    (e) $2x + 4y + 5 = \tan(2\sqrt{2}x + c)/\sqrt{2}$

18. The differential equation $y' = \sqrt{2x - y + 1} + 2$ has the solution
    Select the correct answer.

    (a) $y = ((-x + c)/2)^2$
    (b) $2x - y + 1 = ((-x + c)/2)^2$
    (c) $y = 2(2x - y + 1)^{3/2}/3 + c$
    (d) $y = 2(2x - y + 1)^{3/2}/3 - x + c$
    (e) $2x + y = ((-x + c)/2)^2$

19. Solve the problem $y' = xy$, $y(1) = 2$ numerically for $y(1.2)$ using $h = 0.1$.
    Select the correct answer.

    (a) 2.1
    (b) 2.442
    (c) 2.242
    (d) 2.421
    (e) 2.4

20. Solve the problem $y' = xy^2$, $y(1) = 1$ numerically for $y(1.2)$ using $h = 0.1$.
    Select the correct answer.

    (a) 1.1
    (b) 1.121
    (c) 1.2331
    (d) 1.23
    (e) 1.221

**ANSWER KEY**
***Zill Differential Equations 9e Chapter 2 Form D***

1. d
2. e
3. c
4. d
5. e
6. a
7. d
8. a
9. d
10. b
11. c
12. d
13. b
14. a
15. d
16. d
17. e
18. b
19. b
20. c

1. By hand, sketch isoclines for the differential equation $y' = x+y$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(1) = 2$.

2. Solve the differential equation $y' = x^2y^2$.

3. The solution of the differential equation $y' = xy$ is

   Select the correct answer.

   (a) $y = ce^{x^2}$
   (b) $y = cx^2/2$
   (c) $y = x^2/2 + c$
   (d) $y = c + e^{x^2/2}$
   (e) $y = ce^{x^2/2}$

4. Solve the differential equation $y' = x - y$.

5. The solution of the differential equation $y' + 2y = 3$ is

   Select the correct answer.

   (a) $y = 3x + c$
   (b) $y = 3 + ce^{-2x}$
   (c) $y = 3/2 + ce^{-2x}$
   (d) $y = -3/2 + ce^{2x}$
   (e) $y = 3 + ce^{2x}$

6. Solve the differential equation $xy' + y = 1$.

7. The solution of the differential equation $xy' - y = 1$ is

   Select the correct answer.

   (a) $y = 1 + c/x$
   (b) $y = x^2 + c/x$
   (c) $y = -1 + c/x$
   (d) $y = -1 + cx$
   (e) $y = x + cx$

8. Solve the differential equation $(x^2 - y^2)dx + (y^2 - 2xy)dy = 0$.

9. Solve the differential equation$(e^x + 2y)dx + (2x - \sin y)dy = 0$.

10. The solution of the differential equation $(1 + y/x)dx + (1 + \ln x)dy = 0$ is
    Select the correct answer.

    (a) $x + y + \ln x + c$
    (b) $x + y + y \ln x + c$
    (c) $x + y + y \ln x = c$
    (d) $x + y + \ln x = c$
    (e) The equation is not exact.

11. Solve the differential equation $(x^2 + 2y^2)y' = xy$.

12. The solution of the differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ is
    Select the correct answer.

    (a) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) + c$
    (b) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) = c$
    (c) $\ln(y/x + 1) = c$
    (d) $\ln(y/x + 1) + c$
    (e) $\ln x + \ln(y/x + 1) = c$

13. Solve the differential equation $y' = (1 + x + y)^{-1}$.

14. The solution of the differential equation $y' = -2 + \sqrt{2x + y + 1}$ is
    Select the correct answer.

    (a) $y - 2x + (2x + y + 1)^{3/2}/3 = c$
    (b) $y = -2x + (2x + y + 1)^{3/2}/3 + c$
    (c) $2x + y + 1 - ((x + c)/2)^2 = c$
    (d) $2x + y + 1 = ((x + c)/2)^2$
    (e) $y = (2x + y + c)^2/2 - 2x$

15. Solve the differential equation $x^2y' - xy = -y^2$.

16. Solve the initial value problem $xy' - y = x^2$, $y(1) = 3$.

17. Solve the initial value problem $xy' = y^2 + 1$, $y(1) = 1$.

18. The solution of the differential equation $xy' + y = y^{-2}$ is

    Select the correct answer.

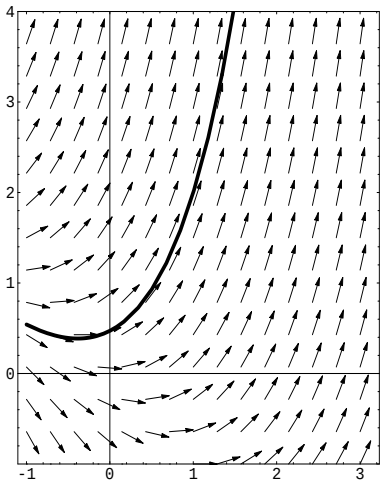
    (a) $y = cx - 1/y$
    (b) $y^3 = 1 + c/x^3$
    (c) $y^3 = 3x/4 + c/x^3$
    (d) $xy = c - y^{-1}$
    (e) $x^2y + y^2 = -2/y + c$

19. A numerical solution is required for the initial value problem $y' = xy - 1$, $y(0) = 1$. Find the approximate value of $y(0.2)$, using $h = 0.1$.

20. A numerical solution is required for the initial value problem $y' = x^2y + 1$, $y(0) = 2$. The approximate value of $y(0.2)$, using $h = 0.1$ is

    Select the correct answer.

    (a) 2.201
    (b) 2.202
    (c) 2.2021
    (d) 2.021
    (e) 2.321

1. 

2. $y = 1/(c - x^3/3)$
3. e
4. $y = x - 1 + ce^{-x}$
5. c
6. $y = 1 + c/x$
7. d
8. $x^3 - 3xy^2 + y^3 = c$
9. $e^x + 2xy + \cos y = c$
10. c
11. $\ln(y^2) - x^2/(2y^2) = c$
12. b
13. $y - \ln(2 + x + y) = c$
14. d
15. $y = x/(c + \ln x)$
16. $y = x^2 + 2x$
17. $y = \tan(\pi/4 + \ln x)$
18. b
19. .809
20. c

1. By hand, sketch isoclines for the differential equation $y' = xy$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(1) = -1$.

2. Solve the differential equation $y' = xy^2$.

3. The solution of the differential equation $y' = y \sin x$ is

   Select the correct answer.

   (a) $y = ce^{-\cos x}$
   (b) $y = -\cos x + c$
   (c) $y = \cos x + c$
   (d) $y = ce^{\cos x}$
   (e) $y = c + e^{\cos x}$

4. Solve the differential equation $y' = x + y$.

5. The solution of the differential equation $y' + 3y = 2$ is

   Select the correct answer.

   (a) $y = 2x + c$
   (b) $y = -2/3 + ce^{3x}$
   (c) $y = 2 + ce^{3x}$
   (d) $y = 2 + ce^{-3x}$
   (e) $y = 2/3 + ce^{-3x}$

6. Solve the differential equation $x^2y' + xy = 1$.

7. The solution of the differential equation $x^2y' - xy = 1$ is

   Select the correct answer.

   (a) $y = 1 + cx$
   (b) $y = x \ln x + cx$
   (c) $y = -1 + c/x$
   (d) $y = -1/(2x) + cx$
   (e) $y = -1/2 + cx$

8. Solve the differential equation $(x^2 + y^2)dx + (y^2 + 2xy)dy = 0$.

9. Solve the differential equation$(e^x - 3y)dx + (-3x - \cos y)dy = 0$.

10. The solution of the differential equation $(1 + x/y)dx + (1 - x/y^2)dy = 0$ is

    Select the correct answer.

    (a) $x + x^2/(2y) + y + x/y + c$
    (b) $x + x^2/(2y) + y + x/y = c$
    (c) $x + x^2/(2y) + y - x/y + c$
    (d) $x + x^2/(2y) + y = c$
    (e) The equation is not exact.

11. Solve the differential equation $2(x + y)y' = y$.

12. The solution of the differential equation $\frac{dy}{dx} = \frac{x+2y}{2x+y}$ is

    Select the correct answer.

    (a) $(x + y)/(x - y)^3 + c$
    (b) $x^2 - y^2 = c$
    (c) $x^2 - y^2 + c$
    (d) $(x + 2y)^3/(x^3y) = c$
    (e) $(x + y)/(x - y)^3 = c$

13. Solve the differential equation $y' + y = xy^4$.

14. The solution of the differential equation $xy' + y = x^2y^2$ is

    Select the correct answer.

    (a) $y = 1/(cx - x^2)$
    (b) $y = 3x/(c - x^3)$
    (c) $y = 1/(cx - x^4/3)$
    (d) $y = (c - x^2)/(2x)$
    (e) $y = 3x/(c - x^2)$

15. The solution of the differential equation $xy' - y = y^{-2}$ is

    Select the correct answer.

    (a) $y^3 = -1 + cx^3$
    (b) $y^3 = 1 + cx^3$
    (c) $y^3 = -1/3 + cx^3$
    (d) $y = -1 + cx^2$
    (e) $y = 1 + cx^2$

16. A numerical solution is required for the initial value problem $y' = xy + 1, y(0) = 1$. Find the approximate value of $y(0.2)$, using $h = 0.1$.

17. A numerical solution is required for the initial value problem $y' = x^2y - 1$, $y(0) = 2$. The approximate value of $y(0.2)$, using $h = 0.1$ is

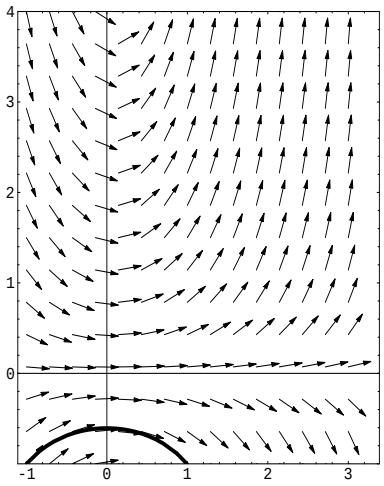
    Select the correct answer.

    (a) 1.8
    (b) 1.81
    (c) 1.812
    (d) 1.8019
    (e) 1.8109

18. Solve the initial value problem $x^2y' + xy = x$, $y(1) = 2$.

19. Solve the initial value problem $xy' = y^2 - 1$, $y(1) = 3$.

20. Solve the initial value problem $y' = 1 + y/x$, $y(1) = 1$.

1. 

2. $y = 1/(c - x^2/2)$
3. a
4. $y = -x - 1 + ce^x$
5. e
6. $y = (\ln x + c)/x$
7. d
8. $x^3 + y^3 + 3xy^2 = c$
9. $e^x - 3xy - \sin y = c$
10. e
11. $y^2 = c(x + 2y)$
12. e
13. $y^3 = 1/(x + 1/3 + ce^{3x})$
14. a
15. a
16. 1.211
17. d
18. $y = 1 + 1/x$
19. $y = (2 + x^2)/(2 - x^2)$
20. $y = x(\ln x + 1)$

1. By hand, sketch isoclines for the differential equation $y' = xy$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(1) = 2$.

2. Solve the differential equation $y' = x^2y^3$.

3. The solution of the differential equation $y' = x^2y$ is

   Select the correct answer.

   (a) $y = ce^{x^2}$
   (b) $y = cx^3/3$
   (c) $y = x^3/3 + c$
   (d) $y = ce^{x^3/3}$
   (e) $y = c + e^{x^3/3}$

4. Solve the differential equation $y' = x + y$.

5. The solution of the differential equation $y' + 4y = 4$ is

   Select the correct answer.

   (a) $y = 4x + c$
   (b) $y = 4x + ce^{-4x}$
   (c) $y = 1 + ce^{-4x}$
   (d) $y = 4x + ce^{4x}$
   (e) $y = 3 + ce^{4x}$

6. Solve the differential equation $xy' - y = 1$.

7. The solution of the differential equation $xy' + y = 1$ is

   Select the correct answer.

   (a) $y = 1 + c/x$
   (b) $y = x^2 + c/x$
   (c) $y = -1 + c/x$
   (d) $y = -1 + cx$
   (e) $y = x + cx$

8. Solve the differential equation $(x^3 - y^3)dx + (y^3 - 3xy^2)dy = 0$.

9. Solve the differential equation $(\cos x + 5y)dx + (5x - \tan y)dy = 0$.

10. The solution of the differential equation $(1 + y/x)dx + (1 - y^2/(2x^2))dy = 0$ is
    Select the correct answer.

    (a) $x + y + y^2/(2x) + c$
    (b) $x + y + y^2/(2x) = c$
    (c) $x + y + y \ln x = c$
    (d) $x + y + \ln x = c$
    (e) The equation is not exact.

11. Solve the differential equation $(x^2 - 2y^2)y' = xy$.

12. The solution of the differential equation $\frac{dy}{dx} = \frac{x+y}{x-y}$ is
    Select the correct answer.

    (a) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) + c$
    (b) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) = c$
    (c) $-\ln(x^2 + y^2) + 2\tan^{-1}(y/x) = c$
    (d) $-\ln(x^2 + y^2) + 2\tan^{-1}(y/x) + c$
    (e) $\ln(x + y) = c$

13. Solve the differential equation $y' = (1 + x + y)^{-1}$.

14. The solution of the differential equation $y' = -3 + \sqrt{3x + y + 2}$ is
    Select the correct answer.

    (a) $y - 2x + (3x + y + 2)^{3/2}/3 = c$
    (b) $y = -2x + (2x + y + 1)^{3/2}/3 + c$
    (c) $3x + y + 2 - ((x + c)/2)^2 = c$
    (d) $3x + y + 2 = ((x + c)/2)^2$
    (e) $y = (3x + y + 2)^2/2 - 2x$

15. Solve the differential equation $xy' - y = y^3$.

16. Solve the initial value problem $xy' + y = x^2$, $y(1) = 2$.

17. Solve the initial value problem $xy' = y^2 - 1$, $y(1) = 2$.

18. The solution of the differential equation $x^2y' + xy = y^{-2}$ is

    Select the correct answer.

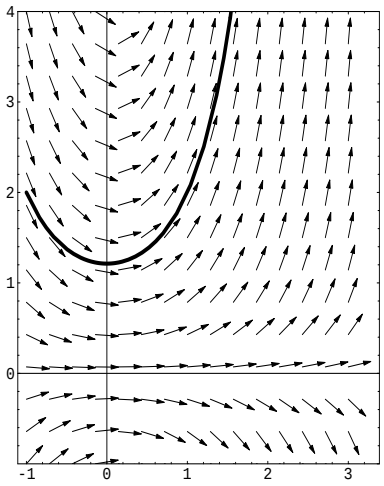
    (a) $y = cx - 1/y$
    (b) $y^3 = 1 + c/x^3$
    (c) $y^3 = 3/(2x) + c/x^3$
    (d) $(xy)^3 = c - 3x^2$
    (e) $x^3y/3 + xy^2/2 = -1/(2y) + c$

19. A numerical solution is required for the initial value problem $y' = x/y$, $y(0) = 1$. Find the approximate value of $y(0.2)$, using $h = 0.1$.

20. A numerical solution is required for the initial value problem $y' = x^2/y$, $y(0) = 2$. The approximate value of $y(0.2)$, using $h = 0.1$ is

    Select the correct answer.

    (a) 2.1
    (b) 2.05
    (c) 2.005
    (d) 2.0005
    (e) 2.15

1. 

2. $y^2 = 1/(c - 2x^3/3)$
3. d
4. $y = -x - 1 + ce^x$
5. c
6. $y = -1 + cx$
7. a
8. $x^4 + y^4 - 4xy^3 = c$
9. $\sin x + 5xy + \ln(\cos y) = c$
10. e
11. $4y^2 = -x^2/(c + \ln y)$
12. c
13. $-y + \ln(x + y + 2) = c$
14. d
15. $y^2 = 1/(-1 + c/x^2)$
16. $y = x^2/3 + 5/(3x)$
17. $y = (3 + x^2)/(3 - x^2)$
18. c
19. 1.01
20. d

1. By hand, sketch isoclines for the differential equation $y' = x+y$ on a graph. Construct a direction field for this equation. Sketch an approximate solution curve that satisfies the differential equation and the initial condition $y(1) = 1$.

2. Solve the differential equation $y' = x^2y^2$.

3. The solution of the differential equation $y' = xy$ is

   Select the correct answer.

   (a) $y = ce^{x^2}$
   (b) $y = cx^2/2$
   (c) $y = x^2/2 + c$
   (d) $y = c + e^{x^2/2}$
   (e) $y = ce^{x^2/2}$

4. Solve the differential equation $y' = x - y$.

5. The solution of the differential equation $y' + 2y = 3$ is

   Select the correct answer.

   (a) $y = 3x + c$
   (b) $y = 3 + ce^{-2x}$
   (c) $y = 3/2 + ce^{-2x}$
   (d) $y = -3/2 + ce^{2x}$
   (e) $y = 3 + ce^{2x}$

6. Solve the differential equation $xy' + y = x$.

7. The solution of the differential equation $xy' - y = x$ is

   Select the correct answer.

   (a) $y = 1 + c/x$
   (b) $y = x^2 + c/x$
   (c) $y = -1 + c/x$
   (d) $y = x \ln x + cx$
   (e) $y = x^3/2 + cx$

8. Solve the differential equation $(x^2 - y^2)dx + (y^2 - 2xy)dy = 0$.

9. Solve the differential equation $(e^x + 2y)dx + (2x - \sin y)dy = 0$.

10. The solution of the differential equation $(1 + y/x)dx + (1 + \ln x)dy = 0$ is
    Select the correct answer.

    (a) $x + y + \ln x + c$
    (b) $x + y + y \ln x + c$
    (c) $x + y + y \ln x = c$
    (d) $x + y + \ln x = c$
    (e) The equation is not exact.

11. Solve the differential equation $(x^2 + 2y^2)y' = xy$.

12. The solution of the differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ is
    Select the correct answer.

    (a) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) + c$
    (b) $\ln(x^2 + y^2) + 2\tan^{-1}(y/x) = c$
    (c) $\ln(y/x + 1) = c$
    (d) $\ln(y/x + 1) + c$
    (e) $\ln x + \ln(y/x + 1) = c$

13. Solve the differential equation $y' = (1 + x + y)^{-1}$.

14. The solution of the differential equation $y' = -2 + \sqrt{2x + y + 1}$ is
    Select the correct answer.

    (a) $2x + y + 1 = ((x + c)/2)^2$
    (b) $y = -2x + (2x + y + 1)^{3/2}/3 + c$
    (c) $2x + y + 1 - ((x + c)/2)^2 = c$
    (d) $y - 2x + (2x + y + 1)^{3/2}/3 = c$
    (e) $y = (2x + y + c)^2/2 - 2x$

15. Solve the differential equation $x^2y' - xy = -y^2$.

16. Solve the initial value problem $xy' - y = x^2$, $y(1) = 3$.

17. Solve the initial value problem $y' = 1 + y/x$, $y(2) = 4$.

18. The solution of the differential equation $xy' + y = y^{-2}$ is

    Select the correct answer.

    (a) $y = cx - 1/y$
    (b) $y^3 = 1 + c/x^3$
    (c) $y^3 = 3x/4 + c/x^3$
    (d) $xy = c - y^{-1}$
    (e) $x^2y + y^2 = -2/y + c$

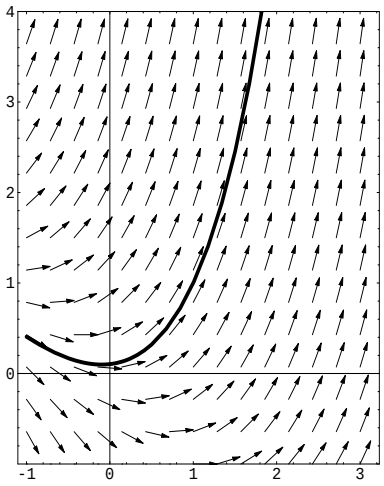
19. A numerical solution is required for the initial value problem $y' = xy$, $y(0) = 1$. Find the approximate value of $y(0.2)$, using $h = 0.1$.

20. A numerical solution is required for the initial value problem $y' = x^2y + 1$, $y(0) = 2$. The approximate value of $y(0.2)$, using $h = 0.1$ is

    Select the correct answer.

    (a) 2.201
    (b) 2.202
    (c) 2.2021
    (d) 2.021
    (e) 2.321

**ANSWER KEY**
***Zill Differential Equations 9e Chapter 2 Form H***

1. 

2. $y = 1/(c - x^3/3)$
3. e
4. $y = x - 1 + ce^{-x}$
5. c
6. $y = x/2 + c/x$
7. d
8. $x^3 + y^3 - 3xy^2 = c$
9. $e^x + 2xy + \cos y = c$
10. c
11. $-x^2/(2y^2) + 2\ln y = c$
12. b
13. $y - \ln(x + y + 2) = c$
14. a
15. $y = x/(c + \ln x)$
16. $y = x^2 + 2x$
17. $y = x(\ln x + 2 - \ln 2)$
18. b
19. 1.01
20. c