Section 2.1.1 - Direction Fields

1. If $a > b$ 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 $0 < P < \frac{a}{b}$
d. decreasing if $0 < P < \frac{a}{b}$
e. increasing if $P > \frac{a}{b}$

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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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 $x > 1$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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3. 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 $-\frac{a}{b} < P < 0$
d. decreasing if $-\frac{a}{b} < P < 0$

e. decreasing if $P < -\frac{a}{b}$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
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4. 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 $x > 4$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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Section 2.1.2 - Autonomous First-Order Des

1. 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

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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2. The differential equation $(x^2+y^2)y' = xy$ is

Select the correct answer.

a. linear
b. homogeneous
c. separable
d. exact
e. Bernoulli

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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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

ANSWER: c
POINTS: 1

Section 2.1.2 - Autonomous First-Order Des

QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
DATE CREATED: 2/2/2016 11:28 AM
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4. The differential equation $y' + y = xy^2$ is
Select the correct answer.

a. linear
b. homogeneous
c. separable
d. exact
e. Bernoulli

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
DATE CREATED: 2/2/2016 11:28 AM
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Section 2.2 - Separable Equations

1. The differential equation $y' = \frac{xe^y}{y}$ is

Select the correct answer.

a. linear
b. homogeneous
c. separable
d. exact
e. Bernoulli

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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Section 2.3 - Linear Equations

1. The differential equation $y' = 2y + \sin x$ is
Select the correct answer.

a. linear
b. homogeneous
c. separable
d. exact
e. Bernoulli

ANSWER: a
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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2. 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. $y = ce^{\frac{x^2}{2}}$
e. $y = c + e^{\frac{x^2}{2}}$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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3. The solution of the differential equation $y' - y = x$ is
Select the correct answer.

a. $y = x - 1 + ce^{-x}$
b. $y = \frac{x^2}{2} + e^{x}$

c. $y = \frac{x^2}{2} + e^{-x}$

d. $y = x - 1 + ce^x$

e. $y = -x - 1 + ce^x$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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4. An integrating factor for the linear differential equation $xy' + y = x$ is
Select the correct answer.

a. 0
b. 1
c. x
d. $\frac{1}{x}$
e. e^x

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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5. An integrating factor for the linear differential equation $y' - \frac{y}{x} = x$ is
Select the correct answer.

a. x
b. x^2
c. $\frac{1}{x}$
d. $\frac{1}{x^2}$
e. e^{-x}

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False

Section 2.3 - Linear Equations

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6. The solution of the differential equation $y' - \frac{y}{x} = y^2$ is
Select the correct answer.

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

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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7. The differential equation $x^2y' = 2xy + \cos x$ is
Select the correct answer.

a. linear
b. homogeneous
c. separable
d. exact
e. Bernoulli

ANSWER: a
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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8. 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. $y = ce^{\frac{x^3}{3}}$

e. $y = c + e^{\frac{x^3}{3}}$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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9. The solution of the differential equation $y' + y = x$ is
Select the correct answer.

a. $y = x - 1 + ce^{-x}$

b. $y = \frac{x^2}{2} + e^x$

c. $y = \frac{x^2}{2} + e^{-x}$

d. $y = x - 1 + ce^x$

e. $y = -x - 1 + ce^x$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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Section 2.4 - Exact Equations

1. The differential equation $2xydx+\left(x^2+1\right)dy=0$ 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

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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2. The differential equation $xydx+\left(x^2+y^2\right)dy=0$ is
Select the correct answer.

a. exact with solution $\frac{x^2y}{2}+\frac{y^3}{3}=c$
b. exact with solution $\frac{x^2y}{2}+\frac{y^2}{2}=c$
c. exact with solution $\frac{x^2y}{2}+\frac{y^3}{3}+c$
d. not exact but having an integrating factor x
e. not exact but having an integrating factor y

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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3. The solution of $(x+2y)dx+ydy=0$ is
Select the correct answer.

a. $\ln x+\ln(y+x)=c$
b. $\ln\left(\frac{y+x}{x}\right)=c$

c. $\ln(y+x)+\dfrac{x}{y+x}=c$

d. $\ln(y+x)+\dfrac{x}{y+x}+c$

e. it cannot be solved

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
DATE CREATED: 2/2/2016 11:28 AM
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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

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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5. The differential equation $(y^3+6xy^4)dx+(3xy^2+12x^2y^3)dy=0$ is
Select the correct answer.

a. exact with solution $\dfrac{y^4}{4}+\dfrac{6xy^5}{5}+\dfrac{3x^2y^2}{2}+4x^3y^3+c$

b. exact with solution $\dfrac{y^4}{4}+\dfrac{6xy^5}{5}+\dfrac{3x^2y^2}{2}+4x^3y^3=c$

c. exact with solution $xy^3+3x^2y^4=c$

d. exact with solution $xy^3+3x^2y^4+c$

e. not exact

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)

Section 2.4 - Exact Equations

HAS VARIABLES: False
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6. 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

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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7. The solution of $(x - 2y)dx + ydy = 0$ is
Select the correct answer.

a. $\ln(y - x) - \dfrac{x}{y - x} = c$
b. $\ln(y - x) - \dfrac{x}{y - x} + c$
c. $\ln x + \ln(y - x) = c$
d. $\ln\dfrac{y + x}{x} = c$
e. it cannot be solved

ANSWER: a
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
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Section 2.5 - Solutions by Substitutions

1. 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. $u=\frac{y}{x}$
e. it cannot be solved using a substitution

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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2. The differential equation $y'-\frac{y}{x}=y^2$ 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. $u=y^{-2}$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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3. The differential equation $y'=(4x+2y+3)^2$ has the solution
Select the correct answer.

a. $y=-\frac{(4x+3)^3}{12}+c$
b. $y=-\frac{(4x+2y+3)^3}{12}+c$
c. $y=-\frac{(4x+2y+3)^3}{3}+c$

d. $y = \sqrt{2}\tan\left(2\sqrt{2}x + c\right)$

e. $4x + 2y + 3 = \sqrt{2}\tan\left(2\sqrt{2}x + c\right)$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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4. The differential equation $y' = \sqrt{x+y+1} - 1$ has the solution
Select the correct answer.

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

b. $y = \frac{2(x+y+1)^{\frac{3}{2}}}{3} + c$

c. $x + y + 1 = \left(\frac{x+c}{2}\right)^2$

d. $y = \frac{2(x+y+1)^{\frac{3}{2}}}{3} - x + c$

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

ANSWER: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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5. An integrating factor for the linear differential equation $y' + \frac{y}{x} = x$ is
Select the correct answer.

a. $\frac{1}{x}$

b. x

c. $\frac{1}{x^2}$

d. x^2

e. e^{-x}

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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6. An integrating factor for the linear differential equation $x^2y' + xy = 1$ is
Select the correct answer.

a. 0

b. 1

c. x

d. $\frac{1}{x}$

e. e^x

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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7. The differential equation $(x-2y)dx + ydy = 0$ can be solved using the substitution
Select the correct answer.

a. $u = xy$

b. $u = \frac{y}{x}$

c. $u = x - 2y$

d. $u = y$

e. it cannot be solved using a substitution

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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Section 2.5 - Solutions by Substitutions

8. The differential equation $y' + \frac{y}{x} = y^2$ 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. $u = y^{-2}$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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9. The solution of the differential equation $y' + \frac{y}{x} = y^2$ is
Select the correct answer.

a. $y = \frac{c}{x} - \frac{x}{2}$
b. $y = \frac{1}{\frac{c}{x} - \frac{x}{2}}$
c. $y = cx - x\ln x$
d. $y = \frac{1}{cx - x\ln x}$
e. $y = 1 + ce^x$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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10. The differential equation $y' = (2x + 4y + 5)^2$ has the solution
Select the correct answer.

a. $y = -\frac{(2x+3)^3}{6} + c$

Section 2.5 - Solutions by Substitutions

b. $y = \frac{(2x+4y+5)^3}{6} + c$

c. $y = \frac{(2x+4y+5)^3}{3} + c$

d. $y = \frac{\tan(2\sqrt{2}x + c)}{\sqrt{2}}$

e. $2x+4y+5 = \frac{\tan(2\sqrt{2}x + c)}{\sqrt{2}}$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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11. The differential equation $y' = \sqrt{2x-y+1} + 2$ has the solution
Select the correct answer.

a. $y = \left(\frac{-x+c}{2}\right)^2$

b. $2x-y+1 = y = \left(\frac{-x+c}{2}\right)^3$

c. $y = \frac{2(2x-y+1)^{\frac{3}{2}}}{3} + c$

d. $y = \frac{2(2x-y+1)^{\frac{3}{2}}}{3} - x + c$

e. $2x+y = \left(\frac{-x+c}{2}\right)^2$

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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Section 2.5 - Solutions by Substitutions

Section 2.6 - A Numerical Method

1. Solve the problem $y' = (x+1)y, \quad y(0) = 1$ 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

ANSWER: e
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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2. Solve the problem $y' = x^2y^2, \quad y(0) = 1$ 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: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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3. Solve the problem $y' = xy, \quad y(1) = 2$ 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

ANSWER: b
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
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Section 2.6 - A Numerical Method

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4. Solve the problem $y' = xy^2, \quad y(1) = 1$ 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: c
POINTS: 1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
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