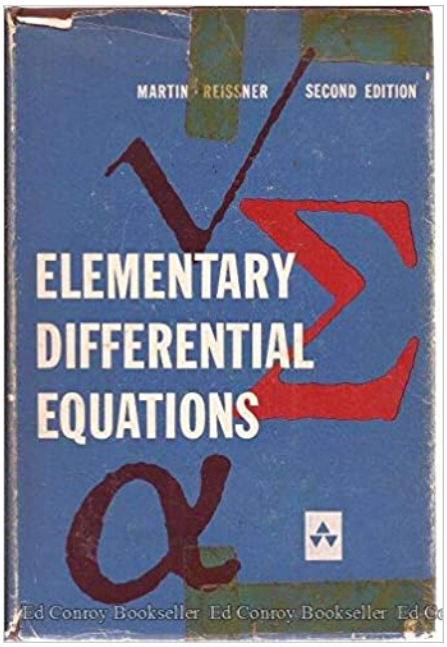
A Solution Manual For

Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961



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1 Exercis 2, page 5

1.1 problem 2(a)

Internal problem ID [2432]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(a).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = 2}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 9

```
dsolve(diff(y(x),x)=2,y(x), singsol=all)
```

$$y(x) = 2x + c_1$$

✓ Solution by Mathematica
Time used: 0.002 (sec). Leaf size: 11

```
DSolve[y'[x]==2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to 2x + c_1$$

1.2 problem 2(b)

Internal problem ID [2433]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(b).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = 2\,\mathrm{e}^{3x}}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 12

```
dsolve(diff(y(x),x)=2*exp(3*x),y(x), singsol=all)
```

$$y(x) = \frac{2\,\mathrm{e}^{3x}}{3} + c_1$$

✓ Solution by Mathematica
Time used: 0.004 (sec). Leaf size: 17

```
DSolve[y'[x]==2*Exp[3*x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{2e^{3x}}{3} + c_1$$

1.3 problem 2(c)

Internal problem ID [2434]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(c).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = \frac{2}{\sqrt{-x^2+1}}}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 10

```
dsolve(diff(y(x),x)=2/sqrt(1-x^2),y(x), singsol=all)
```

$$y(x) = 2\arcsin(x) + c_1$$

✓ Solution by Mathematica
Time used: 0.004 (sec). Leaf size: 28

```
DSolve[y'[x]==2/Sqrt[1-x^2],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -4\arctan\left(\frac{\sqrt{1-x^2}}{x+1}\right) + c_1$$

1.4 problem 2(d)

Internal problem ID [2435]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(d).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = \mathrm{e}^{x^2}}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=exp(x^2),y(x), singsol=all)
```

$$y(x) = \frac{\sqrt{\pi}\ \mathrm{erfi}\left(x\right)}{2} + c_1$$

✓ Solution by Mathematica
Time used: 0.014 (sec). Leaf size: 19

```
DSolve[y'[x]==Exp[x^2],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{1}{2}\sqrt{\pi}\mathrm{erfi}(x) + c_1$$

1.5 problem 2(e)

Internal problem ID [2436]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(e).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = x\,\mathrm{e}^{x^2}}$$

✓ Solution by Maple
Time used: 0.016 (sec). Leaf size: 12

```
dsolve(diff(y(x),x)=x*exp(x^2),y(x), singsol=all)
```

$$y(x) = \frac{\mathrm{e}^{x^2}}{2} + c_1$$

✓ Solution by Mathematica
Time used: 0.004 (sec). Leaf size: 17

```
DSolve[y'[x]==x*Exp[x^2],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{e^{x^2}}{2} + c_1$$

1.6 problem 2(a)

Internal problem ID [2437]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 2(a).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' = \arcsin(x)}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 19

```
dsolve(diff(y(x),x)=arcsin(x),y(x), singsol=all)
```

$$y(x) = x \arcsin(x) + \sqrt{-x^2+1} + c_1$$

✓ Solution by Mathematica
Time used: 0.005 (sec). Leaf size: 23

```
DSolve[y'[x]==ArcSin[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to x \arcsin(x) + \sqrt{1-x^2} + c_1$$

1.7 problem 3(a)

Internal problem ID [2438]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(a).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - yx = 0}$$

✓ Solution by Maple
Time used: 0.015 (sec). Leaf size: 12

```
dsolve(diff(y(x),x)=y(x)*x,y(x), singsol=all)
```

$$y(x) = \mathrm{e}^{\frac{x^2}{2}} c_1$$

✓ Solution by Mathematica
Time used: 0.025 (sec). Leaf size: 22

```
DSolve[y'[x]==y[x]*x,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to c_1 e^{\frac{x^2}{2}}$$
$$y(x) \to 0$$

1.8 problem 3(b)

Internal problem ID [2439]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(b).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - y^2 x^2 = 0}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 15

```
dsolve(diff(y(x),x)=y(x)^2*x^2,y(x), singsol=all)
```

$$y(x) = -\frac{3}{x^3 - 3c_1}$$

✓ Solution by Mathematica
Time used: 0.107 (sec). Leaf size: 22

```
DSolve[y'[x]==y[x]^2*x^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -\frac{3}{x^3 + 3c_1}$$
$$y(x) \to 0$$

1.9 problem 3(c)

Internal problem ID [2440]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(c).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' + x\,\mathrm{e}^{y} = 0}$$

✓ Solution by Maple
Time used: 0.016 (sec). Leaf size: 17

```
dsolve(diff(y(x),x)=-x*exp(y(x)),y(x), singsol=all)
```

$$y(x) = \ln(2) + \ln\left(\frac{1}{x^2 + 2c_1}\right)$$

✓ Solution by Mathematica
Time used: 0.307 (sec). Leaf size: 19

```
DSolve[y'[x]==-x*Exp[y[x]],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \log(2) - \log\left(x^2 - 2c_1\right)$$

1.10 problem 3(d)

Internal problem ID [2441]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(d).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' \sin(y) = x^2}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 16

```
dsolve(diff(y(x),x)*sin(y(x))=x^2,y(x), singsol=all)
```

$$y(x) = \frac{\pi}{2} + \arcsin\left(\frac{x^3}{3} + c_1\right)$$

✓ Solution by Mathematica
Time used: 0.509 (sec). Leaf size: 37

```
DSolve[y'[x]*Sin[y[x]]==x^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -\arccos\left(-\frac{x^3}{3} - c_1\right)$$
$$y(x) \to \arccos\left(-\frac{x^3}{3} - c_1\right)$$

1.11 problem 3(e)

Internal problem ID [2442]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(e).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{xy' - \sqrt{1-y^2} = 0}$$

✓ Solution by Maple
Time used: 0.015 (sec). Leaf size: 9

```
dsolve(diff(y(x),x)*x=sqrt(1-y(x)^2),y(x), singsol=all)
```

$$y(x) = \sin\left(\ln\left(x\right) + c_1\right)$$

✓ Solution by Mathematica
Time used: 0.217 (sec). Leaf size: 29

```
DSolve[y'[x]*x==Sqrt[1-y[x]^2],y[x],x,IncludeSingularSolutions -> True]
```

$$\begin{aligned} y(x) &\to \cos(\log(x) + c_1) \\ y(x) &\to -1 \\ y(x) &\to 1 \\ y(x) &\to \text{Interval}[\{-1, 1\}] \end{aligned}$$

1.12 problem 3(f)

Internal problem ID [2443]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(f).
ODE order: 1.
ODE degree: 2.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y'^2 - y^2 = 0}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 17

```
dsolve((diff(y(x),x))^2-y(x)^2=0,y(x), singsol=all)
```

$$y(x) = \mathrm{e}^{x} c_1$$
$$y(x) = \mathrm{e}^{-x} c_1$$

✓ Solution by Mathematica
Time used: 0.04 (sec). Leaf size: 28

```
DSolve[(y'[x])^2-y[x]^2==0,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to c_1 e^{-x}$$
$$y(x) \to c_1 e^{x}$$
$$y(x) \to 0$$

1.13 problem 3(g)

Internal problem ID [2444]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(g).
ODE order: 1.
ODE degree: 2.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y'^2 - 3y' = -2}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 15

```
dsolve(diff(y(x),x)^2-3*diff(y(x),x)+2=0,y(x), singsol=all)
```

$$y(x) = 2x + c_1$$
$$y(x) = c_1 + x$$

✓ Solution by Mathematica
Time used: 0.003 (sec). Leaf size: 19

```
DSolve[(y'[x])^2-3*y'[x]+2==0,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to x + c_1$$
$$y(x) \to 2x + c_1$$

1.14 problem 3(h)

Internal problem ID [2445]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(h).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{\left(x^2+1\right) y' = 1}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 8

```
dsolve((1+x^2)*diff(y(x),x)=1,y(x), singsol=all)
```

$$y(x) = \arctan\left(x\right) + c_1$$

✓ Solution by Mathematica
Time used: 0.005 (sec). Leaf size: 10

```
DSolve[(1+x^2)*y'[x]==1,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \arctan(x) + c_1$$

1.15 problem 3(i)

Internal problem ID [2446]

Book: Elementary Differential Equations, Martin, Reissner, 2nd ed, 1961
Section: Exercis 2, page 5
Problem number: 3(i).
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' \sin(x) = 1}$$

✓ Solution by Maple
Time used: 0.0 (sec). Leaf size: 14

```
dsolve(diff(y(x),x)*sin(x)=1,y(x), singsol=all)
```

$$y(x) = -\ln(\csc(x) + \cot(x)) + c_1$$

✓ Solution by Mathematica
Time used: 0.005 (sec). Leaf size: 13

```
DSolve[y'[x]*Sin[x]==1,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -\text{arctanh}(\cos(x)) + c_1$$