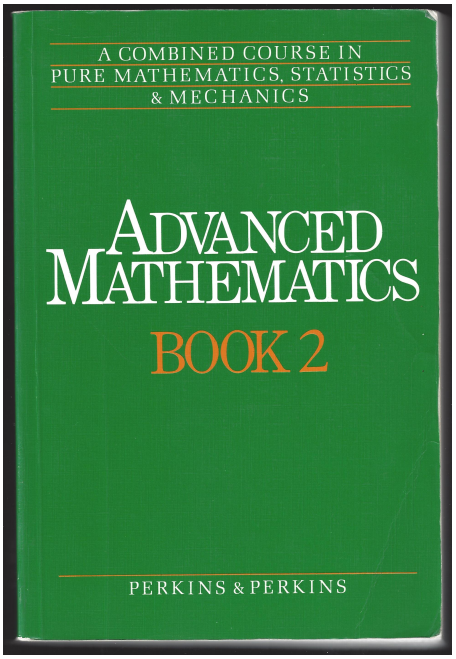
A Solution Manual For

Advanced Mathematica, Book2, Perkin and Perkin, 1992



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1 Chapter 11.3, page 316

1.1 problem 1

Internal problem ID [3052]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 1.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{3y^2y' = 2x - 1}$$

✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 78

```
dsolve(3*y(x)^2*diff(y(x),x)=2*x-1,y(x), singsol=all)
```

$$y(x) = \left(x^2 + c_1 - x\right)^{\frac{1}{3}}$$

$$y(x) = -\frac{\left(x^2 + c_1 - x\right)^{\frac{1}{3}}}{2} - \frac{i\sqrt{3}\left(x^2 + c_1 - x\right)^{\frac{1}{3}}}{2}$$

$$y(x) = -\frac{\left(x^2 + c_1 - x\right)^{\frac{1}{3}}}{2} + \frac{i\sqrt{3}\left(x^2 + c_1 - x\right)^{\frac{1}{3}}}{2}$$

✓ Solution by Mathematica

Time used: 0.257 (sec). Leaf size: 71

```
DSolve[3*y[x]^2*y'[x]==2*x-1,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \sqrt[3]{x^2 - x + 3c_1}$$

$$y(x) \to -\sqrt[3]{-1}\sqrt[3]{x^2 - x + 3c_1}$$

$$y(x) \to (-1)^{2/3}\sqrt[3]{x^2 - x + 3c_1}$$

1.2 problem 2

Internal problem ID [3053]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 2.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - 6xy^2 = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=6*x*y(x)^2,y(x), singsol=all)
```

$$y(x) = \frac{1}{-3x^2 + c_1}$$

✓ Solution by Mathematica

Time used: 0.12 (sec). Leaf size: 22

```
DSolve[y'[x]==6*x*y[x]^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -\frac{1}{3x^2 + c_1}$$
$$y(x) \to 0$$

1.3 problem 3

Internal problem ID [3054]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 3.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - \mathrm{e}^{y} \sin(x) = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

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

$$y(x) = -\ln(\cos(x) - c_1)$$

✓ Solution by Mathematica

Time used: 0.332 (sec). Leaf size: 15

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

$$y(x) \to -\log(\cos(x) - c_1)$$

1.4 problem 4

Internal problem ID [3055]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 4.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 9

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

$$y(x) = \ln\left(\mathrm{e}^{x} + c_1\right)$$

✓ Solution by Mathematica

Time used: 0.769 (sec). Leaf size: 12

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

$$y(x) \to \log\left(e^{x} + c_1\right)$$

1.5 problem 5

Internal problem ID [3056]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 5.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - x \sec(y) = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

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

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

✓ Solution by Mathematica

Time used: 0.436 (sec). Leaf size: 31

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

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

1.6 problem 6

Internal problem ID [3057]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 6.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{y' - 3\cos(y)^2 = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

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

$$y(x) = \arctan(3x + 3c_1)$$

✓ Solution by Mathematica

Time used: 0.387 (sec). Leaf size: 32

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

$$y(x) \to \arctan(3x + 2c_1)$$
$$y(x) \to -\frac{\pi}{2}$$
$$y(x) \to \frac{\pi}{2}$$

1.7 problem 7

Internal problem ID [3058]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 7.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 7

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

$$y(x) = c_1 x$$

✓ Solution by Mathematica

Time used: 0.024 (sec). Leaf size: 14

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

$$y(x) \to c_1 x$$
$$y(x) \to 0$$

1.8 problem 8

Internal problem ID [3059]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 8.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{(1-x)\,y' - y = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 11

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

$$y(x) = \frac{c_1}{x-1}$$

✓ Solution by Mathematica

Time used: 0.028 (sec). Leaf size: 20

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

$$y(x) \to \frac{c_1}{1-x}$$
$$y(x) \to 0$$

1.9 problem 9

Internal problem ID [3060]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 9.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - \frac{4yx}{x^2+1} = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=(4*x*y(x))/(x^2+1),y(x), singsol=all)
```

$$y(x) = c_1 \left(x^2+1\right)^2$$

✓ Solution by Mathematica

Time used: 0.034 (sec). Leaf size: 20

```
DSolve[y'[x]==(4*x*y[x])/(x^2+1),y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to c_1 \left(x^2+1\right)^2$$
$$y(x) \to 0$$

1.10 problem 10

Internal problem ID [3061]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 10.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - \frac{2y}{x^2-1} = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 18

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

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

✓ Solution by Mathematica

Time used: 0.031 (sec). Leaf size: 22

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

$$y(x) \to -\frac{c_1(x-1)}{x+1}$$
$$y(x) \to 0$$

1.11 problem 11

Internal problem ID [3062]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 11.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

With initial conditions

$$[y(1) = -1]$$

✓ Solution by Maple

Time used: 0.032 (sec). Leaf size: 14

```
dsolve([x^2*diff(y(x),x)-y(x)^2=0,y(1) = -1],y(x), singsol=all)
```

$$y(x) = -\frac{x}{-1+2x}$$

✓ Solution by Mathematica

Time used: 0.118 (sec). Leaf size: 14

```
DSolve[{x^2*y'[x]-y[x]^2==0,y[1]==-1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{x}{1-2x}$$

1.12 problem 12

Internal problem ID [3063]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 12.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' + 2yx = 0}$$

With initial conditions

$$[y(0) = 5]$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)+2*x*y(x)=0,y(0) = 5],y(x), singsol=all)
```

$$y(x) = 5\,\mathrm{e}^{-x^2}$$

✓ Solution by Mathematica

Time used: 0.023 (sec). Leaf size: 14

```
DSolve[{y'[x]+2*x*y[x]==0,y[0]==5},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to 5e^{-x^2}$$

1.13 problem 13

Internal problem ID [3064]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 13.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{\cot(x)\, y' - y = 0}$$

With initial conditions

$$[y(0) = 2]$$

✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 8

```
dsolve([cot(x)*diff(y(x),x)=y(x),y(0) = 2],y(x), singsol=all)
```

$$y(x) = 2\sec(x)$$

✓ Solution by Mathematica

Time used: 0.041 (sec). Leaf size: 9

```
DSolve[{Cot[x]*y'[x]==y[x],y[0]==2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to 2\sec(x)$$

1.14 problem 14

Internal problem ID [3065]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 14.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

With initial conditions

$$[y(0) = 0]$$

✓ Solution by Maple

Time used: 0.063 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)=x*exp(-2*y(x)),y(0) = 0],y(x), singsol=all)
```

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

✓ Solution by Mathematica

Time used: 0.333 (sec). Leaf size: 15

```
DSolve[{y'[x]==x*Exp[-2*y[x]],y[0]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{1}{2}\log\left(x^2+1\right)$$

1.15 problem 15

Internal problem ID [3066]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 15.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - 2yx = 2x}$$

With initial conditions

$$[y(0) = 1]$$

✓ Solution by Maple

Time used: 0.015 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)-2*x*y(x)=2*x,y(0) = 1],y(x), singsol=all)
```

$$y(x) = -1 + 2\,\mathrm{e}^{x^2}$$

✓ Solution by Mathematica

Time used: 0.038 (sec). Leaf size: 14

```
DSolve[{y'[x]-2*x*y[x]==2*x,y[0]==1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to 2e^{x^2} - 1$$

1.16 problem 16

Internal problem ID [3067]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 16.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

With initial conditions

$$[y(1) = 1]$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 10

```
dsolve([x*diff(y(x),x)=x*y(x)+y(x),y(1) = 1],y(x), singsol=all)
```

$$y(x) = x\,\mathrm{e}^{x-1}$$

✓ Solution by Mathematica

Time used: 0.028 (sec). Leaf size: 12

```
DSolve[{x*y'[x]==x*y[x]+y[x],y[1]==1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to e^{x-1}x$$

1.17 problem 17

Internal problem ID [3068]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 17.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_quadrature]`

$$\boxed{\left(x^3+1\right)y' = 3\tan\left(x\right)x^2}$$

With initial conditions

$$\left[y(0) = \frac{\pi}{2}\right]$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 36

```
dsolve([(1+x^3)*diff(y(x),x)=3*x^2*tan(x),y(0) = 1/2*Pi],y(x), singsol=all)
```

$$y(x) = 3\left(\int_0^x \frac{\tan\left(\_z1\right)\_z1^2}{\left(\_z1+1\right)\left(\_z1^2-\_z1+1\right)}d\_z1\right) + \frac{\pi}{2}$$

✓ Solution by Mathematica

Time used: 8.597 (sec). Leaf size: 35

```
DSolve[{(1+x^3)*y'[x]==3*x^2*Tan[x],y[0]==Pi/2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \int_0^x \frac{3K[1]^2\tan(K[1])}{K[1]^3+1}dK[1] + \frac{\pi}{2}$$

1.18 problem 18

Internal problem ID [3069]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 18.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

With initial conditions

$$[y(1) = 0]$$

✓ Solution by Maple

Time used: 0.094 (sec). Leaf size: 8

```
dsolve([x*cos(y(x))*diff(y(x),x)=1+sin(y(x)),y(1) = 0],y(x), singsol=all)
```

$$y(x) = \arcsin(x - 1)$$

✓ Solution by Mathematica

Time used: 37.067 (sec). Leaf size: 53

```
DSolve[{x*Cos[y[x]]*y'[x]==1+Sin[y[x]],y[1]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to -2 \arccos\left(\frac{1}{2}(\sqrt{2-x} + \sqrt{x})\right)$$
$$y(x) \to 2 \arccos\left(\frac{1}{2}(\sqrt{2-x} + \sqrt{x})\right)$$

1.19 problem 19

Internal problem ID [3070]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 19.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{xy' - 2y(y-1) = 0}$$

With initial conditions

$$\left[y\left(\frac{1}{2}\right) = 2\right]$$

✓ Solution by Maple

Time used: 0.031 (sec). Leaf size: 15

```
dsolve([x*diff(y(x),x)=2*y(x)*(y(x)-1),y(1/2) = 2],y(x), singsol=all)
```

$$y(x) = -\frac{1}{2x^2 - 1}$$

✓ Solution by Mathematica

Time used: 0.339 (sec). Leaf size: 14

```
DSolve[{x*y'[x]==2*y[x]*(y[x]-1),y[1/2]==2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{1}{1 - 2x^2}$$

1.20 problem 20

Internal problem ID [3071]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 20.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{2xy' + y^2 = 1}$$

With initial conditions

$$[y(1) = 0]$$

✓ Solution by Maple

Time used: 0.032 (sec). Leaf size: 13

```
dsolve([2*x*diff(y(x),x)=1-y(x)^2,y(1) = 0],y(x), singsol=all)
```

$$y(x) = \frac{x-1}{x+1}$$

✓ Solution by Mathematica

Time used: 0.514 (sec). Leaf size: 14

```
DSolve[{2*x*y'[x]==1-y[x]^2,y[1]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \frac{x-1}{x+1}$$

1.21 problem 21

Internal problem ID [3072]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 21.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{(1-x)\,y' - yx = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 15

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

$$y(x) = \frac{c_1 \mathrm{e}^{-x}}{x-1}$$

✓ Solution by Mathematica

Time used: 0.029 (sec). Leaf size: 23

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

$$y(x) \to \frac{c_1 e^{-x}}{x-1}$$
$$y(x) \to 0$$

1.22 problem 22

Internal problem ID [3073]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 22.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{\left(x^2-1\right)y'-\left(x^2+1\right)y=0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 16

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

$$y(x)=\frac{\mathrm{e}^{x}(x-1)\,c_1}{x+1}$$

✓ Solution by Mathematica

Time used: 0.033 (sec). Leaf size: 25

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

$$y(x)\to -\frac{c_1 e^{x}(x-1)}{x+1}$$
$$y(x)\to 0$$

1.23 problem 23

Internal problem ID [3074]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 23.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y' - \mathrm{e}^x \left(y^2 + 1\right) = 0}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 9

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

$$y(x) = \tan\left(\mathrm{e}^x + c_1\right)$$

✓ Solution by Mathematica

Time used: 0.274 (sec). Leaf size: 26

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

$$y(x) \to \tan\left(e^x + c_1\right)$$
$$y(x) \to -i$$
$$y(x) \to i$$

1.24 problem 24

Internal problem ID [3075]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 24.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 19

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

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

✓ Solution by Mathematica

Time used: 2.015 (sec). Leaf size: 21

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

$$y(x) \to \log\left(1 + e^{x^2 + c_1}\right)$$
$$y(x) \to 0$$

1.25 problem 25

Internal problem ID [3076]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 25.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

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

With initial conditions

$$[y(0) = 1]$$

✓ Solution by Maple

Time used: 0.11 (sec). Leaf size: 16

```
dsolve([exp(2*x)*y(x)*diff(y(x),x)+2*x=0,y(0) = 1],y(x), singsol=all)
```

$$y(x) = \sqrt{(1+2x)\,\mathrm{e}^{-2x}}$$

✓ Solution by Mathematica

Time used: 1.816 (sec). Leaf size: 20

```
DSolve[{Exp[2*x]*y[x]*y'[x]+2*x==0,y[0]==1},y[x],x,IncludeSingularSolutions -> True]
```

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

1.26 problem 26

Internal problem ID [3077]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 26.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[_separable]`

$$\boxed{y'yx - \sqrt{y^2 - 9} = 0}$$

With initial conditions

$$[y(\mathrm{e}^4) = 5]$$

✓ Solution by Maple

Time used: 0.046 (sec). Leaf size: 12

```
dsolve([x*y(x)*diff(y(x),x)=sqrt(y(x)^2-9),y(exp(4)) = 5],y(x), singsol=all)
```

$$y(x) = \sqrt{9 + \ln(x)^2}$$

✓ Solution by Mathematica

Time used: 0.256 (sec). Leaf size: 33

```
DSolve[{x*y[x]*y'[x]==Sqrt[y[x]^2-9],y[Exp[4]]==5},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \to \sqrt{\log^2(x) + 9}$$
$$y(x) \to \sqrt{\log^2(x) - 16\log(x) + 73}$$

1.27 problem 27

Internal problem ID [3078]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 27.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[[_homogeneous, 'class C'], _exact, _rational, [_Abel, '2nd ty`

$$\boxed{(y+x-1)\,y'+y=x+1}$$

✓ Solution by Maple

Time used: 0.094 (sec). Leaf size: 27

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

$$y(x)=1-\frac{c_1x+\sqrt{2c_1^2x^2+1}}{c_1}$$

✓ Solution by Mathematica

Time used: 0.163 (sec). Leaf size: 47

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

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

1.28 problem 28

Internal problem ID [3079]

Book: Advanced Mathematica, Book2, Perkin and Perkin, 1992
Section: Chapter 11.3, page 316
Problem number: 28.
ODE order: 1.
ODE degree: 1.

CAS Maple gives this as type `[[_homogeneous, 'class A'], _rational, _Bernoulli]`

$$\boxed{y'yx + y^2 = 2x^2}$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 30

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

$$y(x) = \frac{\sqrt{x^4 + c_1}}{x}$$
$$y(x) = -\frac{\sqrt{x^4 + c_1}}{x}$$

✓ Solution by Mathematica

Time used: 0.206 (sec). Leaf size: 38

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

$$y(x) \to -\frac{\sqrt{x^4 + c_1}}{x}$$
$$y(x) \to \frac{\sqrt{x^4 + c_1}}{x}$$