

## Problem 1

```
y[x_] = Exp[2 x] - 1;  
y'[x] - 2 y[x] == 2 // Simplify
```

True

```
f[t] = a Cos[2 t] + b Sin[2 t];  
∂t,t f[t] + 4 f[t] == 0 // Simplify
```

True

```
y[x] = 2 x3 + 3 x2 + 4 x + 5;  
∂x,x,x y[x] == 12 // Simplify
```

True

## Problem 2

```
Clear[y];
```

```
DSolve[y'[x] == 3 x2/y[x], y[x], x]
```

```
{{y[x] → -√2 √(x3 + C[1])}, {y[x] → √2 √(x3 + C[1])}}
```

```
DSolve[{y'[x] == 3 x2/y[x], y[0] == 1}, y[x], x]
```

```
{{y[x] → √(1 + 2 x3)}}
```

```
DSolve[y'[x] == 4 x (y[x])2, y[x], x]
```

```
{{y[x] →  $\frac{1}{-2 x^2 - C[1]}$ }}
```

```
DSolve[{y'[x] == 4 x (y[x])2, y[0] == 1}, y[x], x]
```

```
{{y[x] →  $\frac{1}{1 - 2 x^2}$ }}
```

## Problem 3

```
DSolve[y'[x] + 2 y[x] == 4, y[x], x]
```

```
{{y[x] → 2 + e-2 x C[1]}}
```

```
DSolve[y'[x] - 4 x y[x] == x, y[x], x]
```

```
{{y[x] → - $\frac{1}{4}$  + e2 x2 C[1]}}
```

```
DSolve[y'[x] + 2 y[x] / x == 2 Cos[x], y[x], x]
```

```
{{y[x] →  $\frac{C[1]}{x^2} + \frac{2(2 x \text{Cos}[x] + (-2 + x^2) \text{Sin}[x])}{x^2}$ }}
```

`DSolve[y' [x] + a y[x] / x == x^n, y[x], x]`

$$\left\{ \left\{ y[x] \rightarrow \frac{x^{1+n}}{1+a+n} + x^{-a} C[1] \right\} \right\}$$