

Section 1.1

- ① 2nd order linear
- ③ 4th order linear
- ⑤ 2nd order
nonlinear
- ⑦ 3rd order linear
- ② Sub $y = e^{mx}$ and solve for m .

$$y = e^{mx}$$
$$y' = me^{mx}$$
$$y'' = m^2 e^{mx}$$

$$\text{DE: } y'' - 5y' + 6y = 0$$

$$m^2 e^{mx} - 5me^{mx} + 6e^{mx} = 0$$

$$(m^2 - 5m + 6) e^{mx} = 0$$

$$m^2 - 5m + 6 = 0$$

$$(m-2)(m-3) = 0$$

$$m = 2, 3$$

(31) Sub $y = x^m$ and solve for m

$$y = x^m$$

$$y' = m x^{m-1}$$

$$y'' = m(m-1) x^{m-2}$$

$$\text{DE: } x y'' + 2y' = 0$$

$$x(m(m-1)x^{m-2}) + 2m x^{m-1} = 0$$

$$m(m-1)x^{m-1} + 2m x^{m-1} = 0$$

$$[m(m-1) + 2m] x^{m-1} = 0$$

$$m(m-1) + 2m = 0$$

$$m^2 - m + 2m = 0$$

$$m^2 + m = 0$$

$$m(m+1) = 0$$

$$m = 0, -1$$