Find the General Solution

$$y'' - 4y = 0$$

$$P(x)y'' + Q(x)y' + R(x)y = G(x)$$

$$y'' + 0y' - 4y = 0$$

$$ar^2 + br + c = 0 \leftarrow$$

$$1r^2 + 0r - 4 = 0$$

$$r^2 - 4 = 0$$
$$+4 \quad\quad +4$$

$$\sqrt{r^2} = \sqrt{4}$$

$$\boxed{r = \pm 2}$$

$$\boxed{\begin{array}{l} r_1 = 2 \\ r_2 = -2 \end{array}}$$

$$ay'' + by' + cy = 0 \quad \begin{array}{l} y = e^{rx} \\ y' = re^{rx} \\ y'' = r^2 e^{rx} \end{array}$$

$$\Downarrow$$

$$ar^2 e^{rx} + bre^{rx} + ce^{rx} = 0$$

$$\Downarrow$$

$$e^{rx}[ar^2 + br + c] = 0$$

$$\Downarrow$$

$$ar^2 + br + c = 0$$

discriminant is greater than zero, 2 real solutions occur

$$y = c_1 e^{r_1 x} + c_2 e^{r_2 x}$$

$$\boxed{y = c_1 e^{2x} + c_2 e^{-2x}}$$

$\uparrow$

General solution