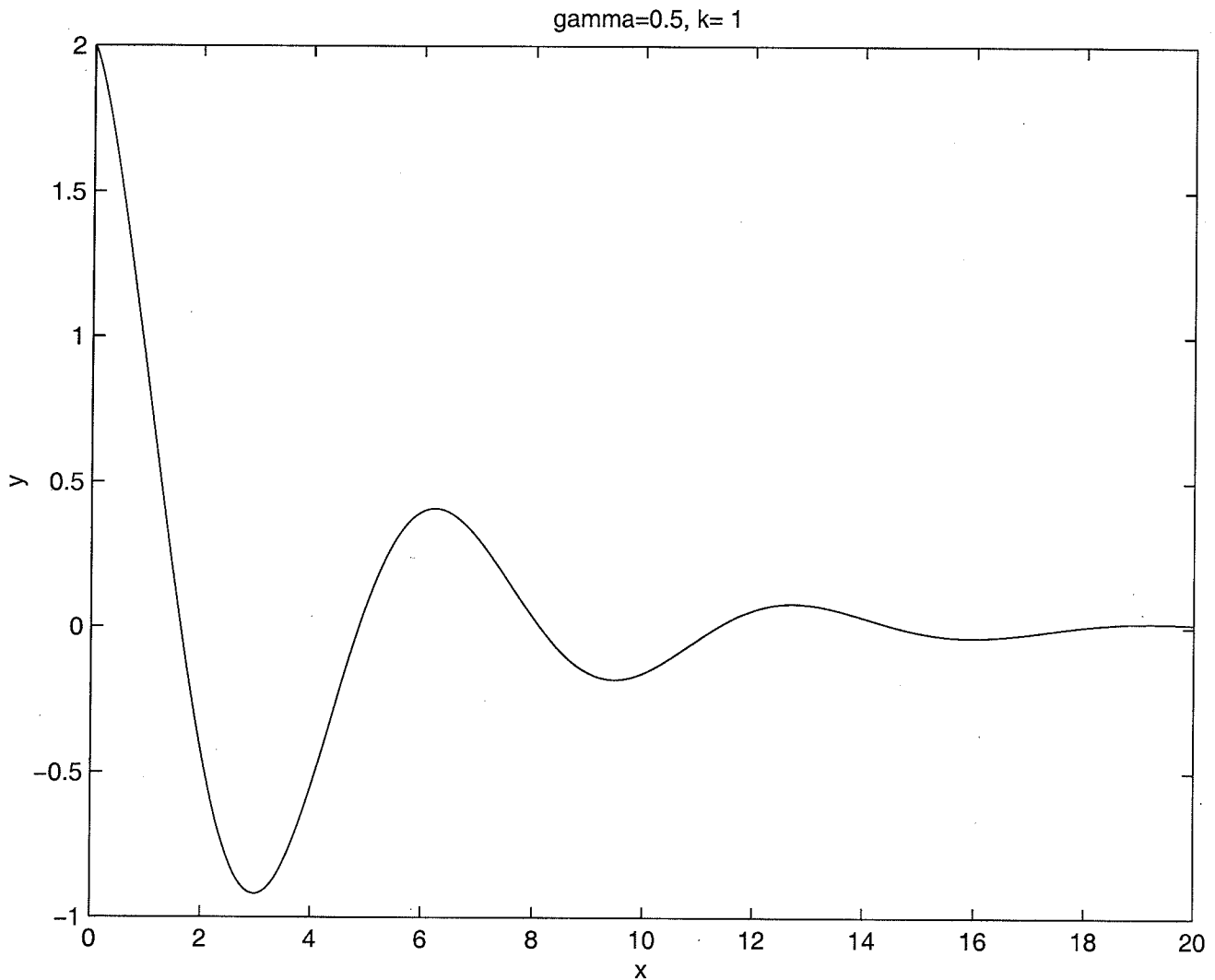


$$y = 2e^{-\frac{\gamma x}{2}} \cos \left[\left(\frac{\sqrt{4k - \gamma^2}}{2} \right) x \right]$$

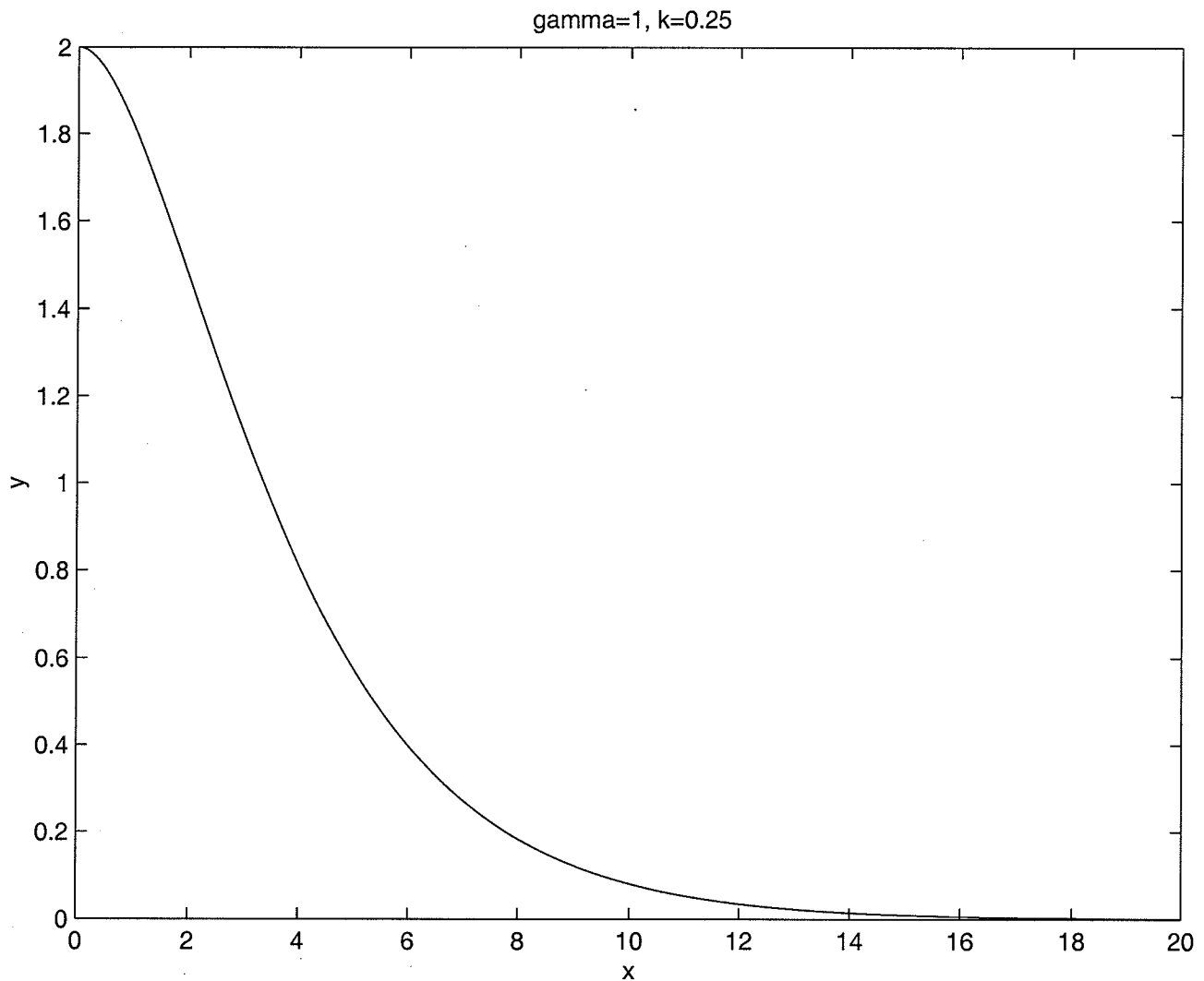


$$y'' + \gamma y' + ky = 0 \quad y(0) = 2, \quad y'(0) = 0$$

damped oscillations, $\gamma^2 - 4k < 0$

$$y = 2e^{-\frac{\gamma x}{2}} + \gamma x e^{-\frac{\gamma x}{2}}$$

(2)



$$y'' + \gamma y' + ky = 0 \quad y(0) = 2, \quad y'(0) = 0$$

critically damped $\gamma^2 = 4k$

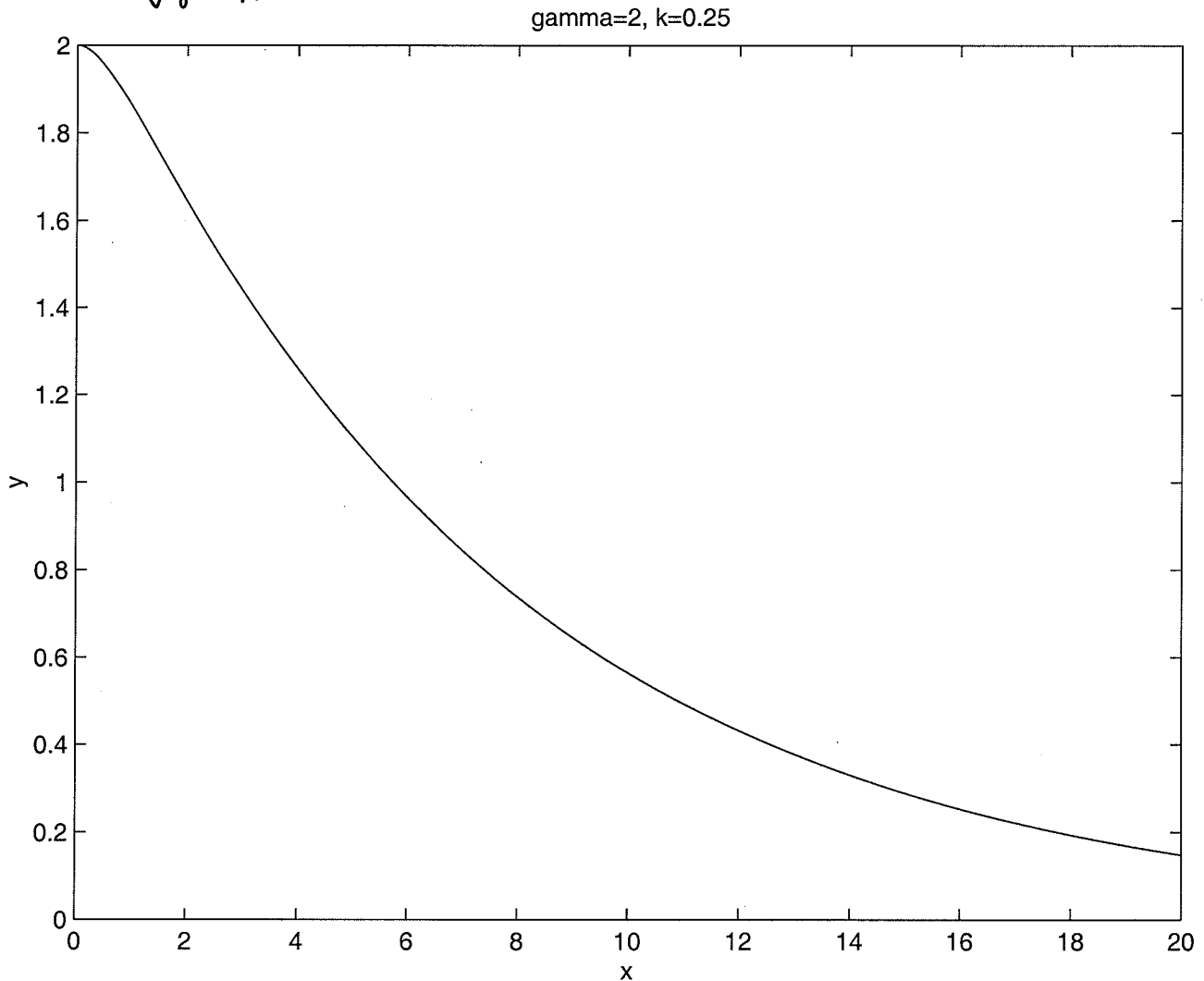
$$y = C_1 \exp \left[-\frac{\gamma x}{2} + \frac{\sqrt{\gamma^2 - 4k} x}{2} \right]$$

(3)

$$+ C_2 \exp \left[-\frac{\gamma x}{2} - \frac{\sqrt{\gamma^2 - 4k} x}{2} \right]$$

$$C_1 = \frac{\gamma + \sqrt{\gamma^2 - 4k}}{\sqrt{\gamma^2 - 4k}}$$

$$C_2 = 2 - C_1$$

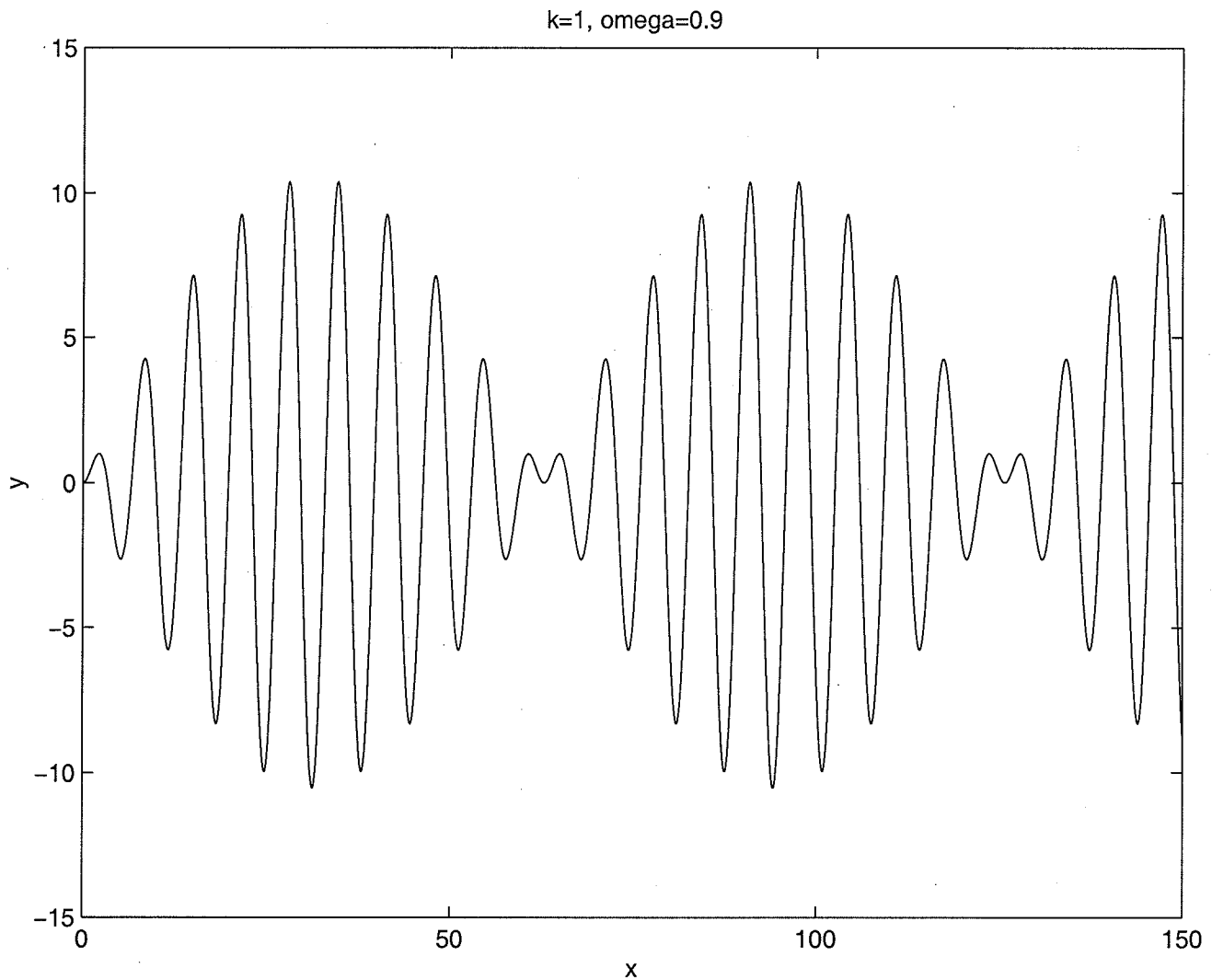


$$y'' + \gamma y' + ky = 0 \quad y(0) = 2 \quad y'(0) = 0$$

overdamped, $\gamma^2 - 4k > 0$

$$y = \left[\frac{2}{(k-\omega^2)} \sin\left(\frac{(\sqrt{k}-\omega)x}{2}\right) \right] \sin\left(\frac{(\sqrt{k}+\omega)x}{2}\right)$$

(4)



$$y'' + ky = \cos(\omega t)$$

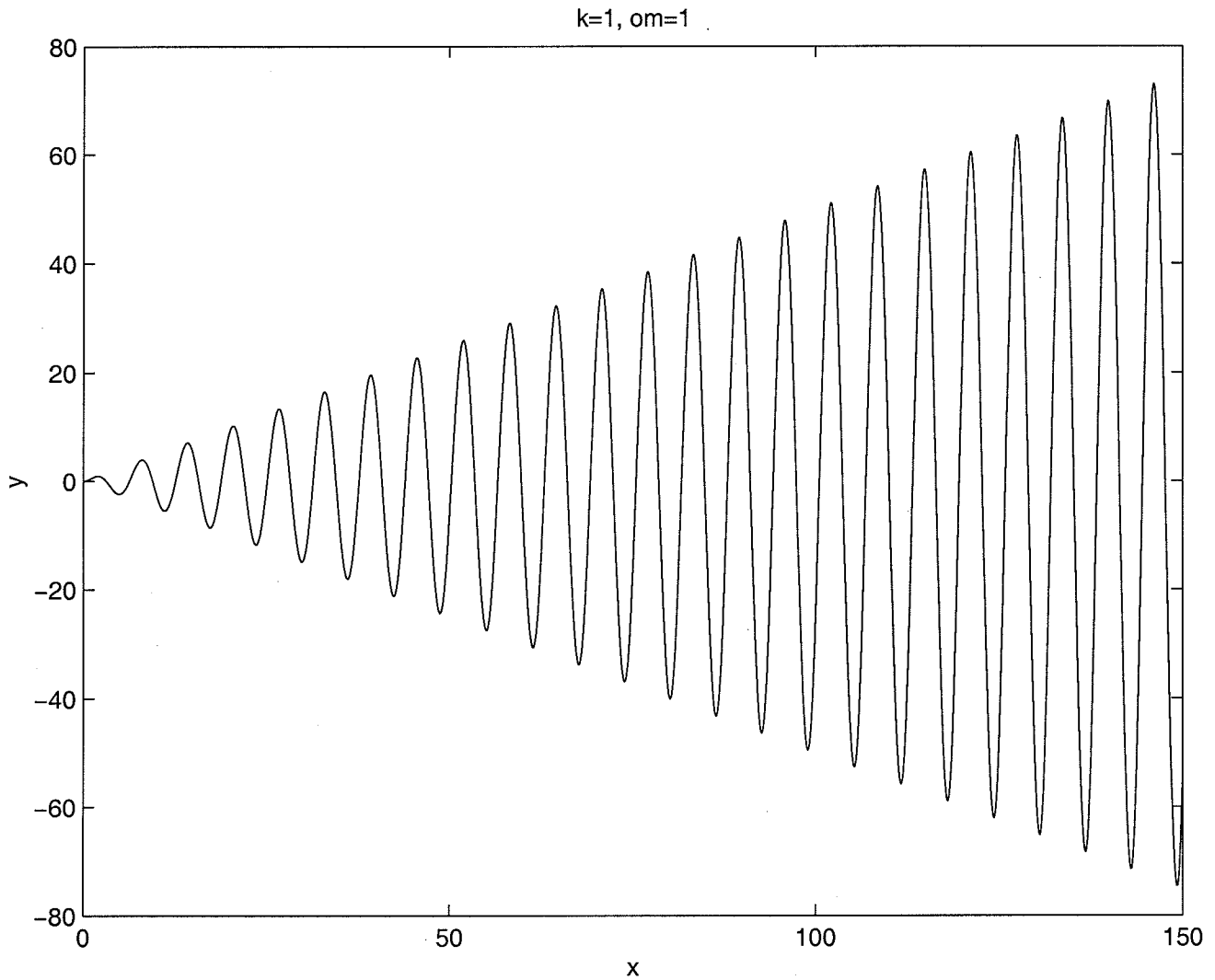
$$\omega \neq \sqrt{k}$$

$$y(0) = y'(0) = 0$$

beating

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$$y = \frac{1}{2\sqrt{k}} x \sin(\sqrt{k}x)$$



$$y'' + ky = \cos(\sqrt{k}x)$$

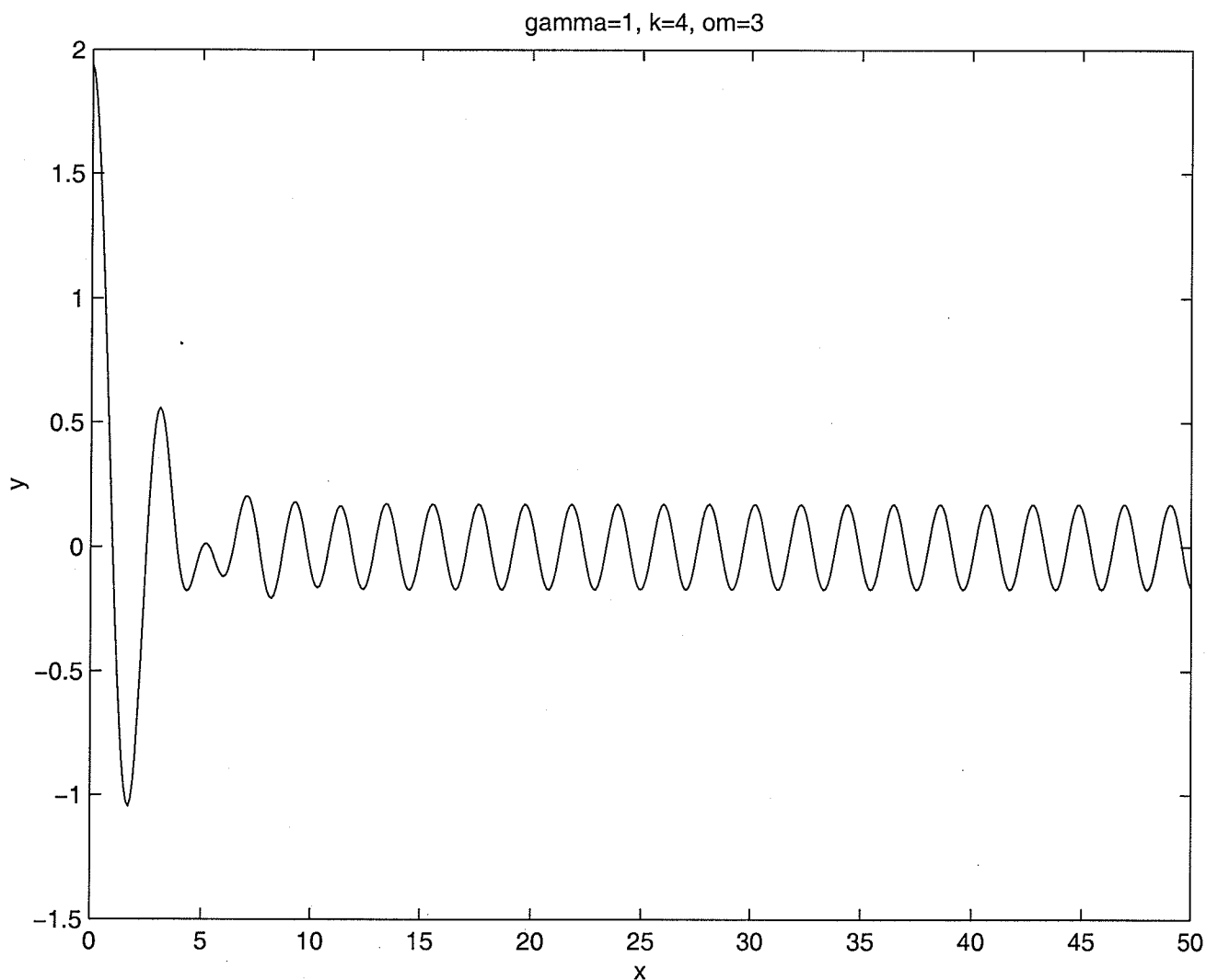
$$y(0) = y'(0) = 0$$

resonance

$$y = \frac{71}{34} e^{-x/2} \cos \frac{\sqrt{15}}{2} x + \frac{55}{68} \frac{2}{\sqrt{15}} e^{-x/2} \sin \frac{\sqrt{15}}{2} x$$

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$$-\frac{5}{34} \cos 3x + \frac{3}{34} \sin 3x$$



$$y'' + y' + 4y = \cos(3x)$$

$$y(0) = y'(0) = 0$$