

$$A = \int_0^{10} \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} t + \frac{\pi}{5} \left( t - \frac{10}{2\pi} \sin \frac{2\pi}{10} t \right) \right] dt$$

$$A = \int_0^{10} \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} t + \frac{\pi}{5} \left( t - \frac{5}{\pi} \sin \frac{\pi}{5} t \right) \right] dt$$

$$A = \int_0^{10} \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} t + \frac{\pi}{5} \left( t - \frac{5}{\pi} \sin \frac{\pi}{5} t \right) \right] dt$$

$$A = \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} (10) + \frac{\pi}{5} \left( 10 - \frac{5}{\pi} \sin \frac{\pi}{5} (10) \right) \right] - \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} (0) + \frac{\pi}{5} \left( 0 - \frac{5}{\pi} \sin \frac{\pi}{5} (0) \right) \right]$$

$$= \left[ -\frac{40}{\pi} \cos \pi + \frac{\pi}{5} \left( 10 - \frac{5}{\pi} \sin 2\pi \right) \right] - \left[ -\frac{40}{\pi} (1) + \frac{\pi}{5} (0 - 0) \right]$$

$$= \left[ -\frac{40}{\pi} \cos \pi + 2\pi - \sin^2 \pi + \frac{40}{\pi} \right]$$

$$A = 31.75$$

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Assignment

c)  $y = 3e^{2x}$  and  $y = 3e^{-x}$  at  $x=1$  and  $x=2$

$$A = \int_a^b y dx$$

$$A = \int_1^2 3e^{2x} dx$$

$$= \left[ \frac{3}{2} e^{2x} \right]_1^2$$

$$= \left[ \frac{3}{2} e^4 - \frac{3}{2} e^2 \right]$$

$$= 81.897 - 11.084$$

$$= 70.81$$

$$y = 3e^{-x}$$

$$A = \int_1^2 3e^{-x} dx$$

$$= \left[ -3e^{-x} \right]_1^2$$

$$= \left[ -3e^{-2} - (-3e^{-1}) \right]$$

$$= -0.406 + 1.104$$

$$= 0.698$$

d)  $y = 2 \sin \frac{\pi}{10} t$  at  $t=0$  and  $t=10$

$$x = 2 + 2t - 2 \cos \frac{\pi}{10} t$$

$$A = \int_a^b y dx$$

$$A = \int_0^{10} \left[ 2 \sin \frac{\pi}{10} t \right] dx$$

$$\frac{dx}{dt} = 2 + \frac{2\pi}{10} \sin \frac{\pi}{10} t$$

$$dx = \left[ 2 + \frac{2\pi}{10} \sin \frac{\pi}{10} t \right] dt$$

$$A = \int_0^{10} \left[ 2 \sin \frac{\pi}{10} t \right] \cdot \left[ 2 + \frac{2\pi}{10} \sin \frac{\pi}{10} t \right] dt$$

$$A = \int_0^{10} \left[ 4 \sin \frac{\pi}{10} t + \frac{4\pi}{10} (\sin \frac{\pi}{10} t)^2 \right] dt$$

$$A = \int_0^{10} \left[ 4 \sin \frac{\pi}{10} t + \frac{4\pi}{10} \left( \sin \frac{\pi}{10} t \right)^2 \right] dt$$

$$A = \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} t + \frac{4\pi}{10} \left( \frac{1 - \cos 2\frac{\pi}{10} t}{2} \right) \right]_0^{10}$$

$$A = \left[ -\frac{40}{\pi} \cos \frac{\pi}{10} t + \frac{4\pi}{10} \cdot \frac{1}{2} \left( t - \frac{10 \sin 2\frac{\pi}{10} t}{10} \right) \right]_0^{10}$$