

Solns. & Key - Exam 2 - Math 161

(A)

$$1. v_a = \frac{s(3) - s(1)}{3 - 1}$$

$$= \frac{2 \cdot 7 + 9 - 3}{2}$$

$$= \frac{54 + 6}{2} = \frac{60}{2} = 30$$

$$v_i = s'(3) = 2 \cdot 3t^2 + 2t \Big|_3$$

$$= 2 \cdot 7 + 6 = 60$$

(A)

(D)

$$2. y' = \frac{\sqrt{x}(e^x f' + e^x f) - (1 + e^x) \cdot \frac{1}{2\sqrt{x}}}{x}$$

$$= \frac{2x(e^x f' + e^x f) - (1 + e^x)}{2x\sqrt{x}}$$


$$= \frac{8(e^4 \cdot 2 + e^4) - (1 + e^4)}{8 \cdot 2}$$

$$= \frac{24e^4 - e^4 - 1}{16} = \frac{23e^4 - 1}{16}$$

$$\textcircled{A} \quad 3. \quad g' = 1 + 2(-\sin x) = 2$$

$$-2\sin x = 1$$

$$\sin x = -\frac{1}{2}$$


$$x = -\frac{\pi}{6}$$

$$\textcircled{B} \quad 4. \quad y' = e^{\sin 2t} \cdot (\cos 2t) \cdot 2 \Big|_{\frac{\pi}{2}}$$

$$= e^{\sin \pi} \cdot (\cos \pi) \cdot 2$$

$$= 1 \cdot (-1) \cdot 2 = -2$$

$$\textcircled{B} \quad 5. \quad h' = \frac{3}{2} \left(2t - \frac{1}{t}\right)^{1/2} \cdot (2 - (-1)t^{-2}) \Big|_1$$

$$= \frac{3}{2} (1)(3) = \frac{9}{2}$$

$$4 - 1 = \frac{9}{2}(x - 1)$$

$$\textcircled{B} \quad 6. \quad g' = \frac{1}{\sqrt{1 - \left(\frac{2}{t}\right)^2}} \cdot (-2)t^{-2} = \frac{-2}{t\sqrt{t^2 - 4}}$$

7E

$$\textcircled{C} \quad 8. \quad \frac{(\cos \theta - 1)(\cos \theta + 1)}{\sin \theta (\cos \theta + 1)} = \frac{-\sin^2 \theta}{\sin \theta (\cos \theta + 1)}$$

$$\rightarrow \frac{-1}{2} \quad \textcircled{C}$$

$$\textcircled{D} \quad 9. \quad \frac{3^{x^2} \cdot \ln 3 \cdot 2x}{2} = 3^4 \cdot \ln 3 \cdot 4$$

$$= 4 \cdot 81 \cdot \ln 3$$

$$= 324 \ln 3.$$

$$\textcircled{E} \quad 10. \quad f'(g(1)) \cdot g'(1) = f'(2) \cdot g'(1)$$

$$= 4 \cdot 10 = 40$$

$$\textcircled{C} \quad 11. \quad \sec^2(x-y) \cdot [1-y'] = [xe^x + e^x] \quad \left| \left(0, \frac{\pi}{4}\right)\right.$$

$$\frac{1}{\left(\frac{1}{2}\right)} \cdot (1-y') = 1$$

$$2(1-y') = 1$$

$$1-y' = \frac{1}{2}$$

$$y' = \frac{1}{2} \quad \textcircled{C}$$

$$12. \quad v = \cos(\pi t) - \pi = 0$$

$$\cos(\pi t) = 0 \quad 0 < \pi t < \pi$$

$$\pi t = \frac{\pi}{2}$$

$$t = \frac{1}{2}$$

$$a = v' = -\sin(\pi t) \cdot \pi \Big|_{\frac{1}{2}}$$

$$= -\sin \frac{\pi}{2} \cdot \pi$$

$$= -\pi$$

(E)

$$13. \quad f = (3x+1)^{-1}$$

(A)

$$f' = (-1)(3x+1)^{-2} \cdot 3$$

$$= -3(3x+1)^{-2}$$

$$f'' = 6(3x+1)^{-3} \cdot 3$$

$$= 18(3x+1)^{-3}$$

$$f''' = -18(3)(3x+1)^{-4} \cdot 3$$

$$= \frac{-18 \cdot 9}{16} = \frac{-9 \cdot 9}{8} = -81/8 \quad (E)$$

(D)

~~14~~. $V = 2\pi r^2$.

$$\frac{dV}{dt} = 2\pi \cdot 2r \cdot \frac{dr}{dt} \Big|_{r=2}$$

$$= 2\pi \cdot 4 \cdot 3$$

$$= 24\pi$$