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dg681

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a) $\dfrac{d}{dn} n\sin n = n\cos n + \sin n$

b) $\dfrac{d}{d\theta} \dfrac{2\theta}{\cos\theta} = 2\theta(\cos\theta)^{-1}$

$$= \dfrac{2}{\cos\theta} + \dfrac{-2\theta\sin\theta}{\cos^2\theta} = 2\tan n$$

$$= \dfrac{2}{\cos\theta} - \dfrac{2\theta\tan\theta}{\cos\theta}$$

$$= (2 - 2\theta\tan\theta)\sec\theta$$

$$= 2(1 - \theta\tan\theta)\sec\theta$$

c) $\dfrac{d}{dt}(t^2 \ln t) = 2t\ln t + t = \underline{t(2\ln t + 1)}$

d) $\dfrac{d}{dy} e^y \cos y = \underline{-e^y \sin y + e^y \cos y}$

e) $\dfrac{d}{dn} \cosh n \sinh n = \dfrac{(e^n + e^{-n})(e^n - e^{-n})}{4}$

$$= \tfrac{1}{4}(e^{2n} - e^{-2n})$$

$$\frac{d}{dn} \rightarrow \frac{1}{4}\left[2e^{2n} + 2e^{-2n}\right]$$

$$= \frac{e^{2n} + e^{-2n}}{2}$$

8) $\dfrac{d}{dn} e^{(n^2+2)} = (2n)e^{(n^2+2)}$

$\underline{7}$

b) $y + e^y \sin y = \dfrac{1}{n}$

$$\frac{d}{dn} : 1\frac{dy}{dn} + \left(e^y \cos y + e^y \sin y\right)\frac{dy}{dn} = -\frac{1}{n^2}$$

$$\frac{dy}{dn}\left[1 + e^y\left(\cos y + \sin y\right)\right] = \frac{-1}{n^2}$$

$$\frac{dy}{dn} = \frac{-1}{n^2 + n^2 e^y(\cos y + \sin y)}$$

a) $n = \dfrac{1}{y + e^y \sin y} = \left(y + e^y \sin y\right)^{-1}$

$$\frac{dn}{dy} = -\left(y + e^y \sin y\right)^{-2}\left(1 + e^y \cos y + e^y \sin y\right)$$

$$\underline{\underline{=}} \quad \frac{-\left(1 + e^y(\cos y + \sin y)\right)}{(y + e^y \sin y)^2}$$

$$\Rightarrow \frac{dy}{dn} = \frac{-(y + e^y(\sin y))^2}{1 + e^y(\cos y + \sin y)}$$

c) $\quad y + e^y\left(\sin y \, \cancel{\text{·}}\right) = \frac{1}{n}$

$$\Rightarrow \frac{dy}{dn} = \frac{-\left(\frac{1}{n}\right)^2}{1 + e^y(\cos y + \sin y)} \qquad (a)$$

$$= \frac{-1}{n^2\left(1 + e^y(\cos y + \sin y)\right)}$$

$$= \frac{-1}{n^2 + n^2 e^y(\cos y + \sin y)} = (b) \checkmark$$

8

a) $y = (x-3)^3 + 2x$

$$\frac{dy}{dx} = 3(x-3)^2 + 2 \quad (=0)$$

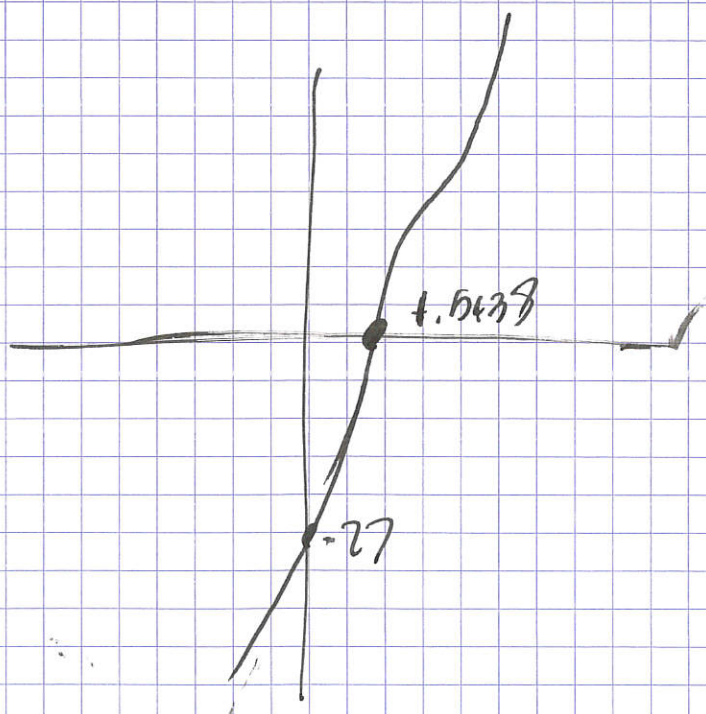$$\rightarrow (x-3) = \sqrt{-\frac{1}{3}}$$

$\rightarrow$ No stationary point

$x = 0$

$\rightarrow y = -27$

$y = 0$

$\rightarrow x \approx -1.0438$

$\rightarrow$

1.5438

-27

7) $y = x e^x$

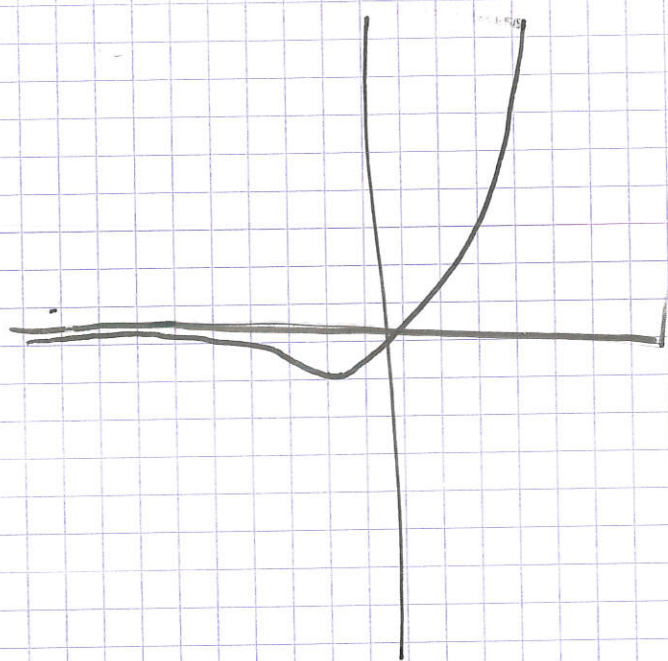$\dfrac{dy}{dx} = x e^x + e^x = e^x(x+1) \ (=0)$

$\rightarrow e^x = 0 \ X$

$(x+1) = 0 \Rightarrow \boxed{x = -1}$

Consider $x > -e$

$\rightarrow \dfrac{dy}{dx} < 0$

$x = 0 \Rightarrow y = 0$

$y = 0 \Rightarrow x = 0$

$\rightarrow$

8) $y = e^x \cos x$

$\dfrac{dy}{dx} = e^x \cos x - e^x \sin x = e^x(\cos x - \sin x) \ (=0)$

$e^x = 0 \ X$

$\cos x = \sin x \rightarrow \boxed{x = \dfrac{\pi}{4}}$

$x = 0 \Rightarrow y = 1$

$\rightarrow \ y = 0 \Rightarrow x = -\dfrac{\pi}{2}$

$\rightarrow$

$\frac{\pi}{4}, 1.551$