

Arbeitsaufgabe

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$$i) F = n^2 i + (3n+2) j + \sin n k.$$

$$a) \frac{dF}{dn} = 2ni + 3j + \cos n k.$$

$$b) \frac{d^2 F}{dn^2} = 2i - \sin n k$$

$$c) \left| \frac{dF}{dn} \right| = \sqrt{2^2 + 3^2 + 1^2} \quad \text{1. c at } n = \left| \frac{dF}{dn} \right| = 2i + 3j + k.$$
$$= \sqrt{13}$$

$$d) F \cdot F = (n^2 i + (3n+2) j + \sin n k) \cdot (n^2 i + (3n+2) j + \sin n k).$$

$$F \cdot F = n^4 + (3n+2)^2 + \sin^2 n.$$

$$\frac{d}{dn} (F \cdot F) = 4n^3 + 2(3)(3n+2) + 2 \cos n$$

at  $n=1$ .

$$= 4 + 1(3) + 2(1).$$

$$= 4 + 3 + 2$$

$$= \underline{\underline{9}}$$

Question 2

$$r = (t + 3t^2)i - 2\sin 3tj + 3e^{3t}k.$$

$$a) \frac{dr}{dt} = (2t + 6t)j - 6\cos 3tj + 9e^{3t}k.$$

$$b) \frac{d^2r}{dt^2} = 2j + 18\sin 3tj + 27e^{3t}k.$$

$$c) \text{at } t = 0.$$

$$2j + 6\sin 0 + 27 \times e^{-2}k.$$

$$2j + 0 + 5.65k$$

$$\left| \frac{d^2r}{dt^2} \right| = \sqrt{2^2 + 5.65^2}$$

$$= 6.16811.$$