

$$1a \quad f'(3) \approx \frac{-2.4 - (-2)}{0.1} = -4 \quad 3 \approx \frac{g(-1.2) - (-0.5)}{-0.2} \quad g(-1.2) \approx -1.1$$

$$1b \quad f'(x) = 2(x^2 + x + 1)(2x + 1) \quad f'(-1) = -2 \quad y = 1 - 2(x + 1) \quad y = 0 \Rightarrow x = -1/2$$

$$1c \quad x = \frac{1 \pm \sqrt{1 - 4 \cdot 1 \cdot (-2)}}{2 \cdot (-2)} = \frac{1 \pm 3}{-4} = \begin{cases} -1 \\ 1/2 \end{cases} \quad \begin{matrix} \xrightarrow{-1} \\ \xrightarrow{1/2} \end{matrix} \quad \begin{matrix} \text{resp } x \leq -1 \\ \text{resp } x \leq -1 \end{matrix}$$

$$1d \quad f(-1.6) \approx f(-2) + \frac{f(-2) - f(-1)}{-2 - (-1)}(-1.6 - (-2)) = -3.2 + \frac{-0.9}{-1} \cdot 0.4 = -2.84$$

$$2a \quad \int_{-1}^3 f(x) dx = \frac{-2.3 - (-1.1)}{2} + \frac{-1.1 - 0.5}{2} + \frac{-0.5 + 0.2}{2} + \frac{0.2 + 1.6}{2} = -1.75$$

$$2b \quad x_0 = -5 \quad x_1 = x_0 - \frac{x_0^3 + 5x_0^2 + 10}{3x_0^2 + 10x_0} = -5.4 \quad x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = -5.35 \quad |f(x_2)| = 0.027 < 0.05$$

$$2c \quad f'(x) = x^2 - x - 6 \quad f(x) = \frac{x^3}{3} - \frac{x^2}{2} - 6x + C \quad 9 - \frac{9}{2} - 18 + C = -1 \quad C = 12.5$$

$$2d \quad f'(x) = 0 \Leftrightarrow x = -2 \text{ or } x = 3 \quad \begin{matrix} \xrightarrow{-2} \\ \xrightarrow{3} \end{matrix} \quad \begin{matrix} x = -2 \text{ lok max} \\ x = 3 \text{ lok min} \end{matrix}$$

$$2d \quad 3x^2 + 2 = 1 - 4x \quad x = \frac{-4 \pm \sqrt{16 - 4 \cdot 3 \cdot 1}}{2 \cdot 3} = \frac{-4 \pm 2}{2 \cdot 3} = \begin{cases} -1 \\ -1/3 \end{cases} \quad \int (-1 - 4x - 3x^2) dx = -\left[x + 2x^2 + x^3\right]_{-1}^{-1/3}$$

$$= 4/27 \approx 0.148$$

$$3a \quad y' = -\frac{3}{4}y \quad y = Ce^{-\frac{3}{4}t} \quad y(0) + y'(0) = C - \frac{3}{4}C = \frac{C}{4} = 2 \quad C = 8$$

$$3b \quad -9A \cos - 9B \sin + 2(-3A \sin + 3B \cos) + 10(A \cos + B \sin)$$

$$= \underbrace{(-9A + 6B + 10A)}_4 \cos + \underbrace{(-9B - 6A + 10B)}_0 \sin \quad \begin{matrix} A + 6B = 4 \\ -6A + B = 0 \\ A = 4/37 \quad B = \frac{24}{37} \end{matrix}$$

$$3c \quad r = -1 \pm 3i \quad y = e^{-t}(C_1 \cos 3t + C_2 \sin 3t)$$

$$y' = -e^{-t}(C_1 \cos + C_2 \sin) + e^{-t}(-3C_1 \sin + 3C_2 \cos) \quad C_1 = 3 \quad \begin{matrix} -C_1 + 3C_2 = -4 \\ C_2 = -1/3 \end{matrix}$$

$$y = e^{-t}(3 \cos 3t - \frac{1}{3} \sin 3t)$$

$$4a \quad 3(1+3t) - 5(1+2t) - 2 - t = 8 \Leftrightarrow -2t - 4 = 8 \Leftrightarrow t = -6 \Rightarrow (-17, -11, 4)$$

$$4b \quad \vec{n} = \vec{AB} \times \vec{F} = (2, -1, 2) \times (5, -1, 3) = (-1, 4, 3) \quad \underline{-x + 4y + 3z = 4 \cdot 2 + 3 \cdot (-1) = -1}$$

$$4c \quad (\sum x^2)k + (\sum x)m = \sum xy \quad 55k + 15m = -10.3$$

$$(\sum x)k + nm = \sum y \quad 15k + 5m = -7.5$$

$$10k = 12.2 \quad k = 1.22 \quad m = (-7.5 - 15k)/5 = -5.16$$

$$4d \quad \begin{cases} k \cdot 1 + m = -3.7 \\ k \cdot 2 + m = -2.9 \\ \vdots \\ k \cdot 5 + m = 1.1 \end{cases} \Rightarrow y = [-3.7, -2.9, \dots, 1.1] \Rightarrow A \setminus y$$

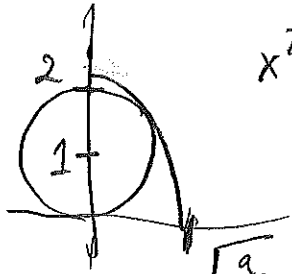
$$\Rightarrow A = [1, 1; 2, 1; \dots; 5, 1]$$

(2)

5a Trig eller + algebra + subst

5b $e^x = t$ följer av ytterligare en subst + algebra

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$$x^2 + (y-1)^2 = 1$$

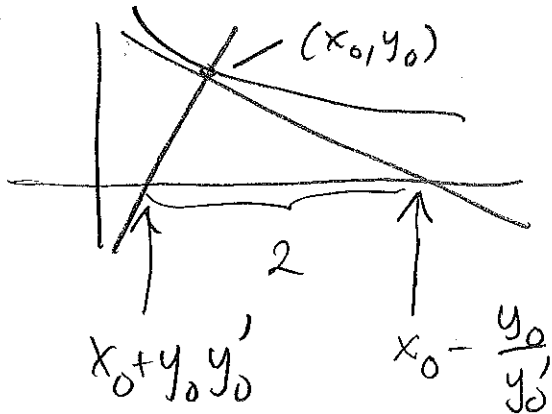
$$y = 1 + \sqrt{1-x^2} = a - kx^2$$

$$y' = \frac{-x}{\sqrt{1-x^2}} = -2kx$$

$$\sqrt{\frac{a}{k}}$$

$$A = \int_0^{\sqrt{\frac{a}{k}}} (a - kx^2) dx = \dots \frac{dA}{dk} = 0 \dots$$

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$$\Rightarrow y' = f(y)$$

separabel