1a $x^2+2x-1=0 \quad x=-1\pm\sqrt{2} \quad VL = x>0$

1b $\frac{x^2-6x+5}{x+1}>0 \quad \frac{(x-1)(x-5)}{x+1}>0$

$-1 \quad 1 \quad 5 \quad x$

$- \quad + \quad - \quad +$

2a $\frac{x^2-x-2}{x(x-2)(\sqrt{x^2-x}+\sqrt{2})} = \frac{(x+1)\cancel{(x-2)}}{x\cancel{(x-2)}(\sqrt{x^2-x}+\sqrt{2})} \to \frac{3}{2\cdot 2\sqrt{2}}$

2b $\frac{\cancel{x-2+4}}{\cancel{(x+2)}(x-2)} \to -\frac{1}{4}, \; x\to -2$

3 $f'(x) = \frac{2x(2x+3)-2(x^2+4)}{(2x+3)^2} = \frac{2(x^2+3x-4)}{(2x+3)^2} = \frac{2(x-1)(x+4)}{(2x+3)^2}$

$-4 \quad -3/2 \quad 1 \quad x$

$+ \quad - \quad - \quad +$

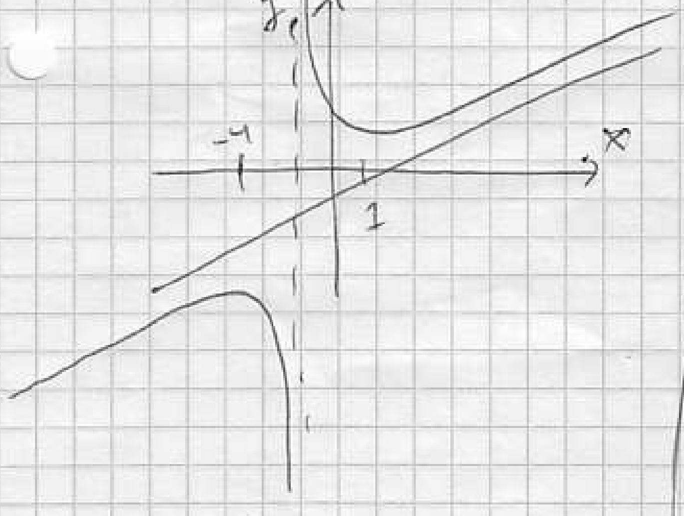
$\underbrace{x=-\frac{3}{2}\notin D_f}_{\text{lodrät asymptot}}$

$\frac{f(x)}{x} = \frac{x^2(1+\frac{4}{x^2})}{x^2(2+\frac{3}{x})} \to \frac{1}{2}, \; x\to\pm\infty$

$f(x)-\frac{x}{2} = \frac{2x^2+8-(2x^2+3x)}{2(2x+3)} = \frac{\cancel{x}(-3+\frac{8}{x})}{\cancel{x}\cdot 2(2+3/x)} \to \frac{-3}{4} \; x\to\pm\infty$

$y=\frac{x}{2}-\frac{3}{4}$ asymptot i $\pm\infty$

x	y
-4	-4
1	1



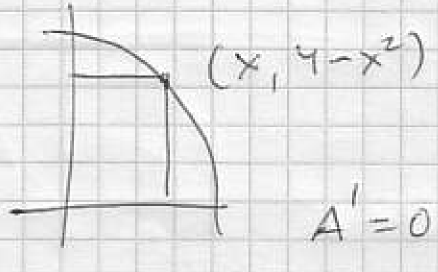
4a $y^3+y=2 \Rightarrow y=1$

$3y^2y'+y'=1 \Rightarrow y'=\frac{1}{4}$

$6yy'\cdot y'+3y^2y''+y''=0$

$\Rightarrow y''=-\frac{6}{4^3}$

4b



$A = x\cdot(4-x^2) \qquad A' = 4-3x^2$

$A' = 0 \Leftrightarrow x = \frac{2}{\sqrt{3}} \qquad A'' < 0 \Rightarrow$ lok max

$A\left(\frac{2}{\sqrt{3}}\right) = \frac{2}{\sqrt{3}}\left(4-\frac{4}{3}\right) = \frac{16}{3\sqrt{3}}$

5a $\quad y' - \frac{1}{x}y = x^2 \qquad IF = e^{-\ln x} = \frac{1}{x}$

$\left(\frac{1}{x}y\right)' = x \qquad \frac{1}{x}y = \frac{x^2}{2}+C \qquad y = \frac{x^3}{2}+Cx$

5b $\quad y_h = A\cos 3x + B\sin 3x$

$y_p = ax^2+bx+c \qquad 2a + 9(ax^2+bx+c) = x^2+x$

$\underbrace{9a}_{1}x^2 + \underbrace{9b}_{1}x + \underbrace{2a+9c}_{0} = x^2+x$

$y = A\cos 3x + B\sin 3x + \frac{1}{9}x^2 + \frac{1}{9}x - \frac{2}{81}$

6a $\quad \int (x^2+2)\sin 2x = \frac{-\cos 2x}{2}(x^2+2) + \int \frac{\cos 2x}{\cancel{2}}\cdot \cancel{2}x$

$= -\frac{\cos 2x}{2}(x^2+2) + \frac{\sin 2x}{2}\cdot x - \underbrace{\int \frac{\sin 2x}{2}}_{\frac{\cos 2x}{4}}$

6b $\quad \int_3^\infty \frac{dx}{(x-1)(x-2)} = \int_3^\infty \left(\frac{-1}{x-1} + \frac{1}{x-2}\right)dx$

$= \left[\ln\left|\frac{x-2}{x-1}\right|\right]_3^\infty = \lim_{x\to\infty} \underbrace{\ln \underbrace{\frac{1-\frac{2}{x}}{1-\frac{1}{x}}}_{\to 1}}_{\to 0} - \ln\frac{1}{2} = \ln 2$