1) $\lim_{x\to 2} f(x) = \lim_{x\to 2} \frac{\sin(x^2-4)}{x-2} = \lim_{x\to 2} \frac{(x+2)\sin(x^2-4)}{(x+2)(x-2)}$ ✓ 5p

$= \lim_{x\to 2}(x+2) \lim_{x\to 2} \frac{\sin(x^2-4)}{x^2-4} = 4$

$\Rightarrow \alpha = 4$ dür. ✓ 5p

2) $f'(x) = -2 + \frac{-(1-x)\sin x + \cos x}{(1-x)^2} + e^x + xe^x$ ✓ 10p

$f'(0) = 0$ ✓ 5p

3) i) $TK = \mathbb{R} - \{2\}$ ✓ 5p

ii) $\lim_{x\to 2^-} \frac{x}{x-2} = -\infty$, $\lim_{x\to 2^+} \frac{x}{x-2} = +\infty$

$x=2$ doğrusu düşey asim.

$\lim_{x\to\mp\infty} \frac{x}{x-2} = 1 \Rightarrow y=1$ doğrusu yatay asim.

iii) $x=0$ için $y=0$ ✓ 5p

iv) $f'(x) = \frac{x-2-x}{(x-2)^2} = -\frac{2}{(x-2)^2}$

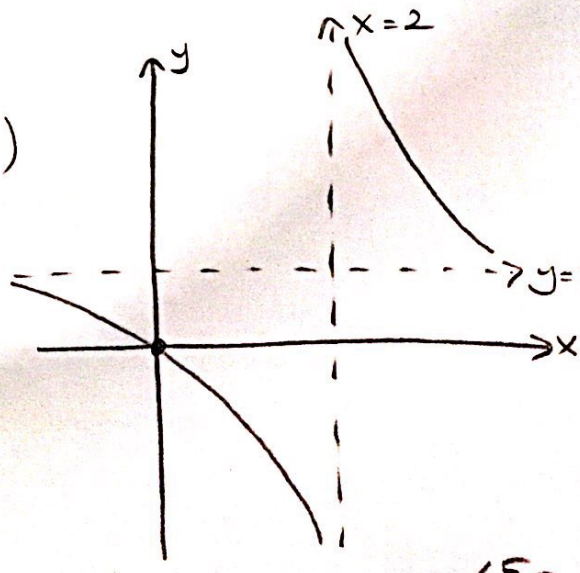
$x=2$ de f' mevcut değil.

v)

x	$-\infty$		0		2		$+\infty$
f'	$-$		$-$		$-$		
f	1	↘	0	↘	$-\infty$ | $+\infty$	↘	1

✓ 5p

vi)



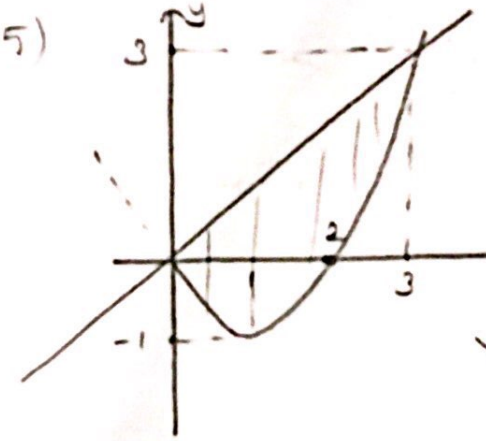
✓ 5p

4) A) $\int (2x - \frac{1}{x} + 1)dx = x^2 - \ln|x| + x + C$ ✓ 1p

B) $e^{x^2} = t \Rightarrow 2xe^{x^2}dx = dt \Rightarrow xe^{x^2}dx = \frac{dt}{2}$ ✓ 5p

$$\int 3xe^{x^2}dx = \int \frac{3}{2}dt = \frac{3}{2}t + C = \frac{3}{2}e^{x^2} + C$$ ✓ 5p

5)



✓ 5p

$$T_A = \int_0^3 [x - (x^2 - 2x)]dx = \int_0^3 (-x^2 + 3x)dx$$ ✓ 5p

$$= -\frac{x^3}{3} + \frac{3}{2}x^2 \Big|_0^3$$

$$= \frac{9}{2}$$ ✓ 5p

6) $\begin{bmatrix} 1 & -3 & 2 \\ -2 & 1 & -3 \\ 3 & 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 13 \\ -13 \\ -4 \end{bmatrix}$

$$\begin{matrix} -3 \\ \\ \\ \end{matrix} \begin{matrix} 2 \\ \\ \\ \end{matrix} \begin{bmatrix} 1 & -3 & 2 & 13 \\ -2 & 1 & -3 & -13 \\ 3 & 2 & -1 & -4 \end{bmatrix} \sim \begin{bmatrix} 1 & -3 & 2 & 13 \\ 0 & -5 & 1 & 13 \\ 0 & 11 & -7 & -43 \end{bmatrix} \begin{matrix} \\ \\ 2 \end{matrix}$$

$$\begin{matrix} \\ 2 \\ \\ \end{matrix} \begin{bmatrix} 1 & -3 & 2 & 13 \\ 0 & -5 & 1 & 13 \\ 0 & 1 & -5 & -17 \end{bmatrix} \sim \begin{bmatrix} 1 & -3 & 2 & 13 \\ 0 & 1 & -5 & -17 \\ 0 & -5 & 1 & 13 \end{bmatrix} \begin{matrix} \\ 3 \\ 5 \end{matrix}$$

$$\begin{matrix} \\ \sim \\ \\ \end{matrix} \begin{bmatrix} 1 & 0 & -13 & -38 \\ 0 & 1 & -5 & -17 \\ 0 & 0 & -24 & -72 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & -13 & -38 \\ 0 & 1 & -5 & -17 \\ 0 & 0 & 1 & 3 \end{bmatrix} \begin{matrix} \\ 5 \\ 13 \end{matrix}$$

$$\begin{matrix} \sim \\ -\frac{1}{24} \\ \\ \end{matrix} \begin{bmatrix} 1 & 0 & -13 & -38 \\ 0 & 1 & -5 & -17 \\ 0 & 0 & -24 & -72 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 3 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$$ ✓ 10p

$$\Rightarrow \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$$ ✓ 5p