k) $\int \frac{\sqrt{x-3}}{1+\sqrt[3]{x-3}}\,dx = \int \frac{t^3}{1+t^2}\,6t^5 dt = 6\int \frac{t^8}{t^2+1}\,dt$

$\ulcorner\ x-3=t^6\ ,\ dx=6t^5dt \qquad = 6\int \left(t^6-t^4+t^2-1+\frac{1}{t^2+1} \right) dt$

$$\begin{array}{r|l} t^8 & t^2+1 \\ \cline{2-2} -(t^8+t^6) & t^6-t^4+t^2-1 \\ \hline -t^6 & \\ -(-t^6-t^4) & \\ \hline t^4 & \\ -(t^4+t^2) & \\ \hline -t^2 & \\ -(-t^2-1) & \\ \hline 1 & \end{array} \qquad = 6\left[\frac{(x-3)^7}{7} - \frac{(x-3)^5}{5} + \frac{(x-3)^3}{3} - (x-3) + \arctan(x-3) \right] + C$$

$\lrcorner$

2) a)

		-1	
$x+1$	$-$	0	$+$

$\int_{-2}^{1} |x+1| . [\![x]\!]\,dx = \int_{-2}^{-1} 2(x+1)\,dx + \int_{-1}^{0} (-x-1)\,dx$

$-2 \leq x < -1$ için $[\![x]\!] = -2 \Rightarrow y = 2(x+1)$

$-1 \leq x < 0$ için $[\![x]\!] = -1 \Rightarrow y = -x-1$

$0 \leq x < 1$ için $[\![x]\!] = 0 \Rightarrow y = 0$

$= (x^2+2x)\Big|_{-2}^{-1} + \left(-\frac{x^2}{2} - x\right)\Big|_{-1}^{0}$

$= (1-2) - (4-4) - \left(\frac{-1}{2}+1\right) = -\frac{3}{2}$

b)

		-1	0	1	
x	$-$	$-$	0 $+$		$+$
x^2-1	$+$	0 $-$	$-$	0	$+$
x^3-x	$-$	$+$	$-$		$+$

$\int_0^2 \mathrm{sgn}(x^3-x)\,dx = \int_0^1 -dx + \int_1^2 dx$

$= -x\Big|_0^1 + x\Big|_1^2 = -1+1 = 0$

c) $f(x) = \frac{x\cos x}{1+x^2}$ fonksiyon ; $f(-x) = -\frac{x\cos x}{1+x^2} = -f(x)$ olduğundan

tek fonksiyondur. İntegral aralığı simetrik olduğundan $\int_{-\pi/2}^{\pi/2} \frac{x\cos x}{1+x^2}\,dx = 0$ dır.

3) $\frac{d}{dx}\left(\int_{1-x}^{\ln x} (t+\tan t^2)\,dt \right) = (\ln x)' . \left[\ln x + \tan(\ln x)^2\right] - (1-x)' . \left[1-x+\tan(1-x)^2\right]$

$= \frac{1}{x}\left[\ln x + \tan(\ln x)^2\right] + 1 - x + \tan(1-x)^2$