1. $\lim_{x\to 2}\frac{1}{x-2}\int_{2}^{x}(t^2+t+1)\,dt$

$=\lim_{x\to 2}\frac{\int_{2}^{x}(t^2+t+1)dt}{x-2}$

$=\lim_{x\to 2}\frac{x^2+x+1}{1}=4+2+1=7$

2. $\lim_{x\to 0}\frac{1}{x}\int_{0}^{x}|t-a|\,dt$ (a 는상수)

$\Rightarrow \lim_{x\to 0}\frac{\int_{0}^{x}|t-a|dx}{x}=\lim_{x\to 0}\frac{|x-a|}{1}=|-a|=|a|$

3. $\lim_{h\to 0}\frac{1}{n}\int_{1}^{1+2h}(x^4-x^2+1)\,dx$

$=\lim_{h\to 0}\frac{\int_{1}^{1+2h}(x^4-x^2+1)\,dx}{h}$

$=\lim_{h\to 0}\frac{F(1+2h)-F(1)}{h}=\lim_{h\to 0}f(1+2h)\cdot 2$

$=f(1)\cdot 2=1\cdot 2=2$

4. $\lim_{h\to 0}\frac{1}{n}\int_{3-h}^{3+h}|x^2-4|\,dx$

$=\lim_{h\to 0}\frac{F(3+h)-F(3-h)}{h}$

$=\lim_{h\to 0}\{f(3+h)+f(3-h)\}=2f(3)=2\times 5=10$

5. $\int_{1}^{x}f(t)dt=x^4+x^3-2ax$, $a=?$ $f(x)=?$

ⅰ) 미분 $:f(x)=4x^3+3x^2-2a$

ⅱ) $x=1$: $0=1+1-2a$ $a=1$

6. $\int_{a}^{x}x(t+3)f(t)dt=x^4-27x^2$ $(a>0)$ $a=?$ $f(x)=?$

$\Rightarrow x\int_{a}^{x}(t+3)f(t)dt=x^4-27x^2$

$\int_{a}^{x}(t+3)f(t)dt=x^3-27x$

ⅰ) 미분 $:(x+3)f(x)=3x^2-27$

$=3(x^2-9)$

$f(x)=3(x-3)$

ⅱ) $x=a$: $0=a^3-27a$

$a(a^2-27)=0$ ... $a=\sqrt{27}=3\sqrt{3}$

7. $xf(x)=2x^3-3x^2+\int_{1}^{x}f(t)\,dt$ ... $f(x)=?$

$\Rightarrow f(x)+xf'(x)=6x^2-6x+f(x)$

$f'(x)=6x-6$ $f(x)=3x^2-6x+c$

$x=1$: $f(1)=-13-6+c=-1$ $c=2$

$\therefore$ $f(x)=3x^2-6x+2$

8. $f(x)=x^2+2x+\int_{0}^{x}f'(t)dt$ $f'(2)-f(2)=?$

$\Rightarrow f'(x)=2x+2+\int_{0}^{x}f'(t)dt$

$=2x+2+f(x)-f(0)$

$f'(x)-f(x)=2x+2-f(0)$

$f'(2)-f(2)=6-f(0)$ 또 $x=0$: $f(0)=0$

$\therefore$ 6