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1. 次の不定積分, 定積分を求めよ.

(1)  $\int (2x+1)^5 dx$  (\*)

2x+1=t とおくと  
2 =  $\frac{dt}{dx}$  →  $dx = \frac{dt}{2}$

26/31 (\*) =  $\int t^5 \frac{dt}{2} = \frac{1}{2} \times \frac{t^6}{6} = \frac{(2x+1)^6}{12}$

(2)  $\int_{-1}^0 (2x+1)^5 dx$  (\*)

(1) と同じ

23/31 (\*) =  $\left[ \frac{1}{12} (2x+1)^6 \right]_{-1}^0$   
=  $\left\{ \frac{1}{12} \times 1^6 - \frac{1}{12} (-1)^6 \right\} = 0$

又は 2x+1=t とおくと x=0 ⇒ t=1, x=-1 ⇒ t=-1

4 =  $\int_{-1}^1 t^5 \frac{dt}{2} = \left[ \frac{t^6}{12} \right]_{-1}^1 = 0$

(3)  $\int \sin 2x dx$  (\*)

23/31 基本  $(\cos x)' = -\sin x$   
 $\int \sin x dx = -\cos x$

2x=t とおくと  $dx = \frac{dt}{2}$

(\*) =  $\int \sin t \frac{dt}{2} = \frac{1}{2} \int \sin t dt$   
=  $-\frac{1}{2} \cos t$   
=  $-\frac{1}{2} \cos 2x$

18/31 (4)  $\int x \sin 2x dx$  (\*) =  $x \int \sin 2x dx$  (18不可)

(1) (5)  $(-\frac{1}{2} \cos 2x)' = \sin 2x$

部分積分

(\*) =  $\int x (-\frac{1}{2} \cos 2x) dx =$   
=  $-\frac{1}{2} x \cos 2x - \int (x)' (-\frac{1}{2} \cos 2x) dx$   
=  $-\frac{1}{2} x \cos 2x + \frac{1}{4} \sin 2x //$

(5)  $\int_0^{\frac{\pi}{2}} x \sin 2x dx$

$\int \cos 2x dx$   
=  $\frac{1}{2} \sin 2x$   
と覚えておく

(4) (5)

18/31 =  $\left[ -\frac{x}{2} \cos 2x + \frac{1}{4} \sin 2x \right]_0^{\frac{\pi}{2}}$   
=  $\left( -\frac{\pi}{4} \cos \pi + \frac{1}{4} \sin \pi \right) - \left( 0 + \frac{1}{4} \sin 0 \right)$   
=  $\frac{\pi}{4} //$

(6)  $\int_{\frac{1}{2}}^1 \sqrt{2x-1} dx$

18/31 2x-1=t とおくと  
2 =  $\frac{dt}{dx}$ ,  $dx = \frac{dt}{2}$

x =  $\frac{1}{2}$  のとき t=0, x=1 のとき t=1

たから  
=  $\int_0^1 \sqrt{t} \frac{dt}{2} = \left[ \frac{1}{3} t^{\frac{3}{2}} \right]_0^1$

$\int \sqrt{t} dt = \frac{2}{3} t^{\frac{3}{2}}$  と覚えておく =  $\frac{1}{3} //$