#6.6.1(2)

$\int \frac{1}{x^2+3^2}\,dx$

$= \frac{1}{3}\tan^{-1}\frac{1}{3}x + C$ (C는 적분 상수)

#6.6.1(3)

$-(x^2-2x-15)$

$= -(x-5)(x+3)$

$\frac{1}{-(x-5)(x+3)}$

$= -\left(\frac{\frac{1}{8}}{x-5} + \frac{-\frac{1}{8}}{x+3}\right)$

$= -\frac{1}{8}\left(\frac{1}{x-5} + \frac{-1}{x+3}\right)$

$\int \frac{1}{15+2x-x^2}\,dx$

$= -\frac{1}{8}\int\left(\frac{1}{x-5} - \frac{1}{x+3}\right)dx$

$= -\frac{1}{8}\left(\ln|x-5| - \ln|x+3|\right) + C$

$= -\frac{1}{8}\ln\left|\frac{x-5}{x+3}\right| + C$ (C는 적분 상수)

#6.6.1(4)

$\int \frac{1}{\sqrt{x^2-3^2}}\,dx = \sin^{-1}\frac{1}{3}x + C$ (C는 적분 상수)

#6.6.1.(6)

$e^x = t$라 하자.

$e^x \cdot dx = dt$.

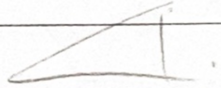
$\int \frac{t}{\sqrt{1-t^2}} \cdot \frac{1}{t} \, dt$.

$= \int \frac{1}{\sqrt{1-t^2}} \, dt$

$= \sin^{-1} t + C$

$= \sin^{-1} e^x + C$. (C는 적분 상수)

#6.6.2(2)



$\int_0^{\frac{1}{6}} \frac{1}{\sqrt{1-9x^2}} \, dx$.

$= \int_0^{\frac{1}{6}} \frac{1}{\sqrt{9}\sqrt{\frac{1}{9}-x^2}} \, dx$.

$= \frac{1}{3} \int_0^{\frac{1}{6}} \frac{1}{\sqrt{\frac{1}{9}-x^2}} \, dx$.

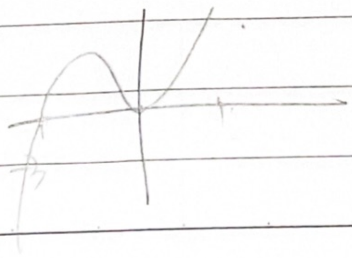
$= \frac{1}{3} \left[\sin^{-1} 3x \right]_0^{\frac{1}{6}}$.

$= \frac{1}{3} \left(\sin^{-1} \frac{1}{2} - \sin^{-1} 0 \right)$

$= \frac{1}{3} \cdot \frac{1}{6}\pi = \frac{1}{18}\pi$

#7.1.1(1)

$x^2(x+3)$.

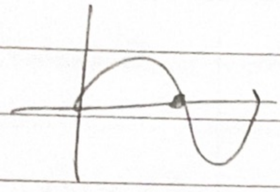


$\int_0^2 (x^3+3x^2)\,dx$

$= \left[\frac{1}{4}x^4 + x^3\right]_0^2$

$= \frac{1}{4}\cdot 16 + 8 = 12$

#7.1.1(3)



$\int_0^\pi \sin x\,dx$

$= [-\cos x]_0^\pi$

$= -(-1-1) = 2$

#7.1.3(1)

$2y = 2 - x$. $y = -\frac{1}{2}x + 1$

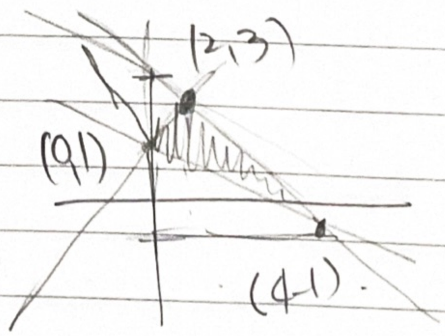
$y = x + 1$.

$y = -2x + 7$

$-\frac{1}{2}x + \cancel{1} = x + \cancel{1}$ ∴ $x = 0$. $(0,1)$

$-\frac{1}{2}x + 1 = -2x + 7$

$\frac{3}{2}x = 6$ ∴ $x = 4$. $(4,-1)$

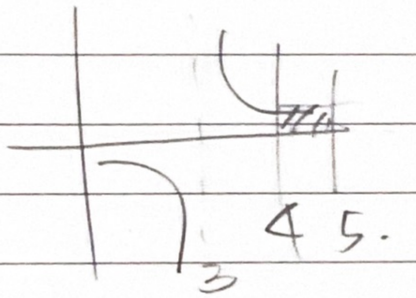


$x+1=-2x+7$

$3x=6.$ $\quad x=2$ $\quad \underline{(2,3)}$

$\frac{1}{2}(2+4)\times 2+\frac{1}{2}\times 2\times 4-\frac{1}{2}\times 4\times 2=6$

#7.1.4(1)



$S=\int_4^5 \frac{2}{x-3}\,dx.$

$=2\left[\ln|x-3|\right]_4^5$

$=2(\ln 2-\ln 1)=2\ln 2$

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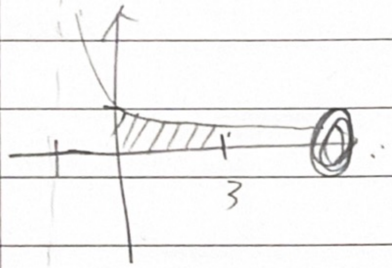
#7.2.1.(6)



$y = (x+1)^{-\frac{1}{2}}$

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

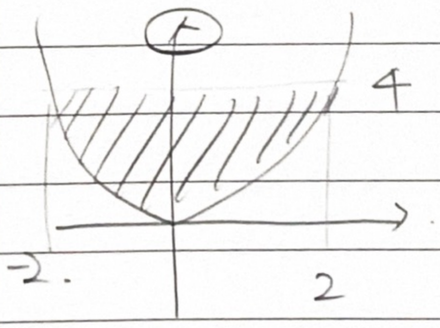
$= -\frac{1}{2}\frac{1}{(x+1)^{\frac{3}{2}}} < 0$.

$V_x = \int_0^3 \pi \cdot \frac{1}{x+1}\, dx$.

$= \pi\left[\ln|x+1|\right]_0^3$

$= \pi(\ln 4 - \ln 1) = 2\pi\ln 2$

#7.2.2(3)



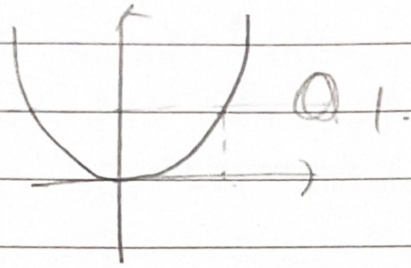
$V_y = \int_0^4 \pi x^2\, dy$.

$= \int_0^4 \pi y\, dy$.

$= \left[\frac{1}{2}y^2\right]_0^4$

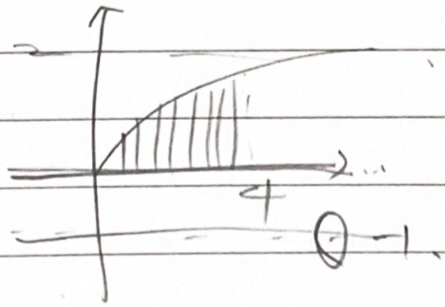
$= \frac{1}{2}\cdot 16 = 8$.

#7.2.3(3)



$$V_{y=1} = \int_1^0 2\pi x(y-1)\,dy$$
$$= \int_1^0 2\pi\sqrt{y}\,(y-1)\,dy$$
$$= \int_1^0 2\pi\left(y^{\frac{3}{2}} - y^{\frac{1}{2}}\right)dy$$
$$= 2\pi\cdot\left[\frac{2}{5}y^{\frac{5}{2}} - \frac{2}{3}y^{\frac{3}{2}}\right]_1^0$$
$$= 2\pi\left(-\frac{2}{5}+\frac{2}{3}\right)$$
$$= 2\pi\cdot\frac{-6+10}{15}$$
$$= 2\pi\cdot\frac{4}{15} = \frac{8}{15}\pi$$

#7.2.3.(4)



$$V_{y=-1} = \int_0^2 2\pi x(y+1)\,dy$$
$$= 2\pi\int_0^2 (y^3+y^2)\,dy$$
$$= 2\pi\left[\frac{1}{4}y^4+\frac{1}{3}y^3\right]_0^2$$
$$= 2\pi\left(\frac{1}{4}\cdot 16+\frac{1}{3}\cdot 8\right)$$
$$= 2\pi\cdot\left(4+\frac{8}{3}\right) = \frac{40}{3}\pi$$