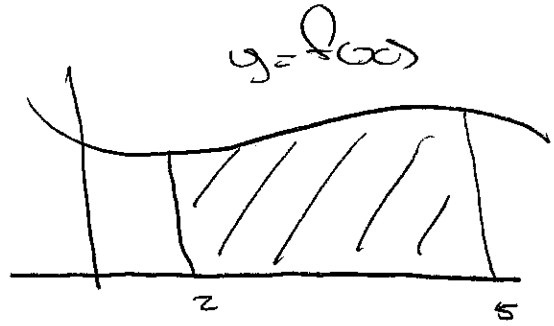
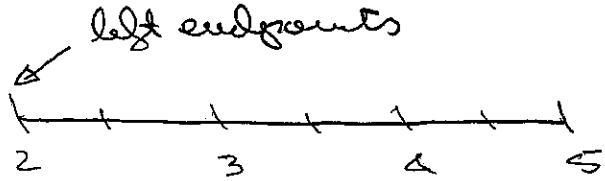
#1



n = 6 rectangles

$\Delta x = \frac{5-2}{6} = \frac{1}{2}$

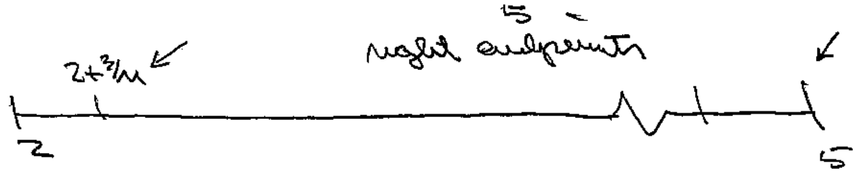


$$\int_2^5 f(x)\,dx \approx f(2)*\tfrac{1}{2} + f(2.5)*\tfrac{1}{2} + f(3)*\tfrac{1}{2} + f(3.5)*\tfrac{1}{2} + f(4)*\tfrac{1}{2} + f(4.5)*\tfrac{1}{2}$$

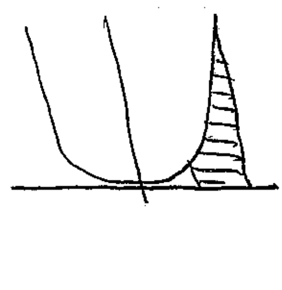
#2 function $f(x) = x^4$

$$\lim_{n\to\infty} \sum_{k=1}^{n} (2+k*3/n)^4 * 3/n = \lim_{n\to\infty} \sum_{k=1}^{n} f(2+k*3/n) * 3/n$$

$$= \lim_{n\to\infty} \Big[f(2+3/n)*3/n + f(2+2*3/n)*3/n + \dots + f(\underbrace{2+n*3/n}_{5}) * 3/n \Big]$$



$$\int_2^5 x^4\,dx$$



#3 $\int_0^4 (1+3y-y^2)\,dy$

$= \left(y + 3y^2/2 - y^3/3\right)\Big|_0^4$

$= 4 + 3/2 * 4^2 - 64/3$

#4 $\int_{-5}^{5} \frac{2}{x^3}\,dx = 2\int_{-5}^{5} x^{-3}\,dx$

$= 2\,\frac{x^{-2}}{-2}\Big|_{-5}^{5} = -\frac{1}{x^2}\Big|_{-5}^{5}$

$= -\frac{1}{25} + \frac{1}{25} = 0$

#5 $\int_0^1 (3 + x\sqrt{x})\,dx$

$= \int_0^1 (3 + x^{3/2})\,dx$

$= \left(3x + 2/5\, x^{5/2}\right)\Big|_0^1$

$= 3 + 2/5$

#6 $g(x) = \int_0^{x^2} \sin^2 t \, dt$

Let $u = x^2$

$g(x) = \int_0^{u} \sin^2 t \, dt$

Chain rule

$g'(x) = \frac{dg}{du}\frac{du}{dx} = \sin^2 u * 2x$

$= 2x \sin^2(x^2)$

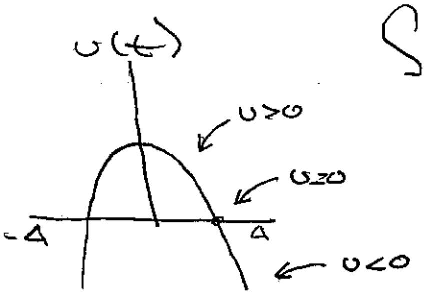
#7a displacement

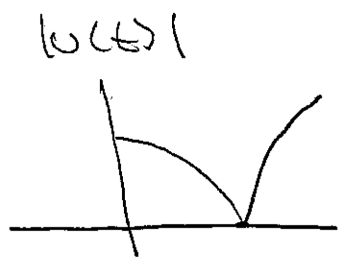
$s(6) - s(0) = \int_0^6 v(t) dt$

$= \int_0^6 (32 - 2t^2) dt = (32t - 2/3 t^3) \Big|_0^6$

$= 32 * 6 - 2/3 * 216$

#7b distance traveled





$\int_0^6 |v(t)| dt = \int_0^6 |32 - 2t^2| dt$

$= \int_0^4 (32 - 2t^2) dt + \int_4^6 -(32 - 2t^2) dt$

$= \int_0^4 (32 - 2t^2) dt - \int_4^6 (32 - 2t^2) dt$

$= (32t - 2/3 t^3)\Big|_0^4 - (32t - 2/3 t^3)\Big|_4^6$

etc.