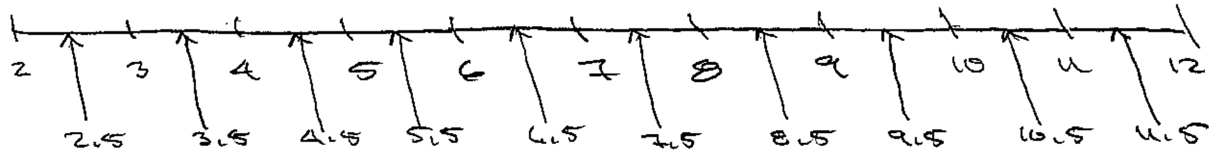
#1 $\Delta x = \frac{12-2}{10} = 1$



area $\approx 1 * [f(2.5) + f(3.5) + f(4.5) + f(5.5) + f(6.5)$
$+ f(7.5) + f(8.5) + f(9.5) + f(10.5)$
$+ f(11.5)]$

#2 $\lim\limits_{n \to \infty} \sum\limits_{k=1}^{n} \frac{\pi}{4n} * \tan(k * \frac{\pi}{4n})$

start $\frac{\pi}{4n}$

$= \lim\limits_{n \to \infty} \frac{\pi}{4n} * [\tan(\frac{\pi}{4n}) + \tan(2 * \frac{\pi}{4n}) + \tan(3 * \frac{\pi}{4n})$
$+ \dots + \tan(n * \frac{\pi}{4n})]$

$\Delta x = \frac{\pi/4}{n}$

function
$\tan(\ )$

stop $\frac{\pi}{4}$

$\int_0^{\pi/4} \tan x \, dx$

#3 $\int_0^{\pi} (4\sin\theta - 3\cos\theta)\, d\theta$

$= (-4\cos\theta - 3\sin\theta)\Big|_0^{\pi}$

$= (-4\cos\pi - 3\sin\pi) - (-4\cos 0 - 3\sin 0)$

$= 4 + 4 = 8$

#4 $\int_1^2 \frac{x + 5x^7}{x^3}\, dx$

$= \int_1^2 (x^{-2} + 5x^4)\, dx$

$= \left(\frac{x^{-1}}{-1} + \frac{5x^5}{5}\right)\Big|_1^2$

$= \left(-\frac{1}{x} + x^5\right)\Big|_1^2$

$= \left(-\frac{1}{2} + 32\right) - (-1 + 1)$

$= 63/2$

#5 $\int_1^8 \frac{x-1}{\sqrt[3]{x^2}}\,dx$

$= \int_1^8 \frac{x-1}{x^{2/3}}\,dx$

$= \int_1^8 \left(x^{1/3} - x^{-2/3}\right) dx$

$= \left(3/4\, x^{4/3} - 3x^{1/3}\right)\Big|_1^8$

$= \left[3/4\,(8)^{4/3} - 3(8)^{1/3}\right] - \left[3/4\,(1)^{4/3} - 3(1)^{1/3}\right]$

$= \left[3/4 * 16 - 3 * 2\right] - \left[3/4 - 3\right]$

$= 12 - 6 - 3/4 + 3$

$= 33/4$

#6 $\frac{d}{dx} g(x) = \frac{d}{dx} \int_{1-3x}^{1} \frac{t^3}{1+t^2}\,dt$

Set $u = 1-3x$

$= \frac{d}{dx} \int_u^1 \frac{t^3}{1+t^2}\,dx = -\frac{d}{dx} \int_1^u \frac{t^3}{1+t^2}\,dt$

$= -\frac{d}{du} \int_1^u \frac{t^3}{1+t^2}\,dt * \frac{du}{dx}$

$= -\frac{u^3}{1+u^2} * (-3) = \frac{3(1-3x)^3}{1+(1-3x)^2}$

#7a

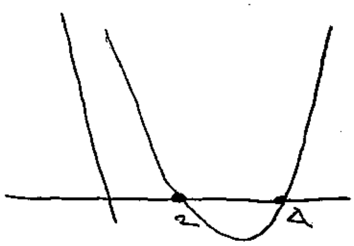
$$\int_0^6 (t^2 - 6t + 8)\, dt$$

$$= \left(t^3/3 - 3t^2 + 8t\right)\Big|_0^6$$

$$= 12.$$

#7b $\int_0^6 |t^2 - 6t + 8|\, dt$

$t^2 - 6t + 8$



$$= \int_0^2 (t^2 - 6t + 8)\, dt$$
$$+ \int_2^4 -(t^2 - 6t + 8)\, dt$$
$$+ \int_4^6 (t^2 - 6t + 8)\, dt$$

$$= \left(t^3/3 - 3t^2 + 8t\right)\Big|_0^2$$
$$- \left(t^3/3 - 3t^2 + 8t\right)\Big|_2^4$$
$$+ \left(t^3/3 - 3t^2 + 8t\right)\Big|_4^6$$