1a) $\int \ln(e^{3x})dx = \int 3x\,dx = 3\,\frac{x^2}{2} + C$

1b) $\int [\ln(e^{x}) + \ln(e^{-x})]\,dx = \int (x - x)\,dx = \int 0\,dx = C$

2a) $\int \frac{7}{\sqrt{x}}dx = 7\int x^{-1/2}dx = 7\,\frac{x^{\frac{1}{2}}}{\frac{1}{2}} + C = 14x^{3/2} + C$

2b) $$\int \frac{\sqrt{3+\sqrt{x}}}{\sqrt{x}}\,dx$$

let $u=\sqrt{x}$

$du = \frac{1}{2\sqrt{x}}\,dx$

$$\frac{d\,x^{\frac{1}{2}}}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$$

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

$$= \frac{1}{2}\int (3+u)^{\frac{1}{2}}\,du$$

$$= \frac{1}{2}\,\frac{(3+u)^{3/2}}{3/2} + C = \frac{1}{3}(3+\sqrt{x})^{3/2} + C$$

3a) $\int_0^{\pi} \sin\left(\frac{x}{3}\right) dx =$

let $u = \frac{x}{3}$
$du = \frac{1}{3} dx$

$= 3 \int_{x=0}^{\pi} \sin u \, du$

$= -3 \cos\left(\frac{x}{3}\right) \Big|_0^{\pi}$

$= -3\left(\cos\frac{\pi}{3} - \cos 0\right)$

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

$= \frac{3}{2}$

3 b) $\displaystyle\int_0^{\ln\sqrt{2}} \frac{1+\cos(e^{-2x})}{e^{2x}}\,dx$

let $u = e^{-2x}$

$du = e^{-2x}(-2)\,dx$

$x=0 \quad u=1$

$x=\ln\sqrt{2} \quad u = e^{-2\ln\sqrt{2}}$

$= e^{-\ln(\sqrt{2})^2}$

$= e^{-\ln 2}$

$= e^{\ln\frac{1}{2}}$

$= \frac{1}{2}$

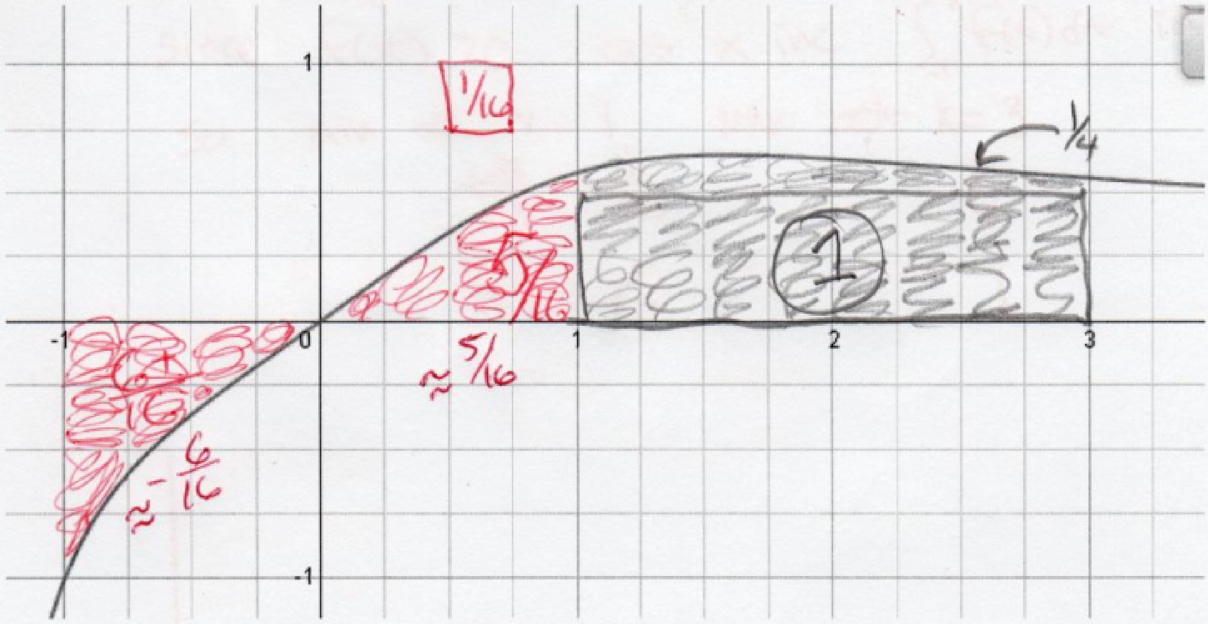
$\displaystyle -\frac{1}{2}\int_0^{\ln\sqrt{2}} \left[1+\cos(e^{-2x})\right](-2e^{-2x}\,dx)$

$\displaystyle -\frac{1}{2}\int_1^{\frac{1}{2}} (1+\cos u)\,du$

$\displaystyle -\frac{1}{2}\left(u+\sin u\right)\Big|_1^{\frac{1}{2}} = -\frac{1}{2}\left(\frac{1}{2}+\sin(\tfrac{1}{2}) - (1+\sin(1))\right)$

$\displaystyle = -\frac{1}{4} - \frac{\sin(\frac{1}{2})}{2} + \frac{1}{2} + \frac{\sin(1)}{2}$

$\displaystyle = \frac{1}{4} - \frac{\sin(\frac{1}{2})}{2} + \frac{\sin(1)}{2} = .431$



$\int_{-1}^{1} f(t)\,dt \doteq -\frac{1}{16}$ about zero

4

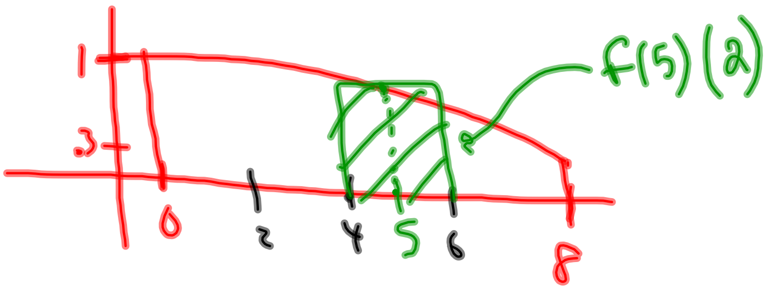
$\int_{-1}^{3} f(t)\,dt = 1\frac{3}{16} \quad \frac{19}{16}$

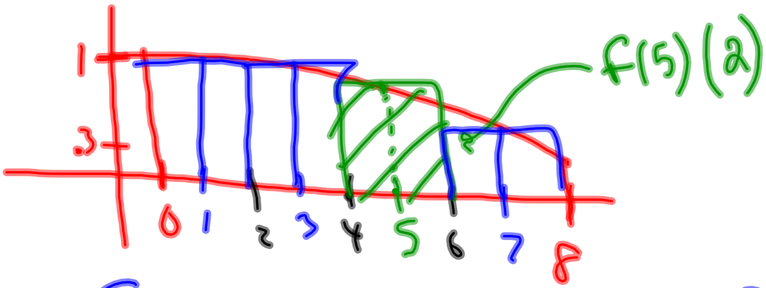
5) $f(x) = \cos\left(\frac{x}{2\pi}\right)$ $\quad [0, 8] \quad n = 4$

$x=0 \Rightarrow f(x) = \cos(0) = 1$

$x=8 \Rightarrow f(8) = \cos\left(\frac{4}{\pi}\right) \doteq \cos(1.2) > \cos\left(\frac{\pi}{2}\right) = 0$

this $f(x) > 0$ on $[0, 8]$





$$A = [f(1) + f(3) + f(5) + f(7)] \cdot 2 = 6.032$$

6 a) $\sum_{i=7}^{20} e^2 = \underset{i=7}{e^2} + \underset{8}{e^2} + \dots + \underset{20}{e^2}$

$= 14e^2$

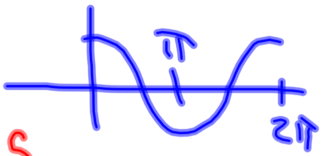
6b) $\sum_{k=1}^{365} (k-(k+2)) =$

$(1-\cancel{3})+(2-\cancel{4})+(\cancel{3}-\cancel{5})+(\cancel{4}-\cancel{6})+\dots+(\cancel{363}-\cancel{365})+(\cancel{364}-366)+(\cancel{365}-367)$

$1+2-366-367 = -730$

$$7)\quad 3\int_1^4 f(x)\,dx - \int_1^4 g(x)\,dx = 3(2) - 10 = -4$$

$$8a)\quad \frac{1}{\pi - 0}\int_0^{\pi} \pi \cos x\,dx = \int_0^{\pi} \cos x\,dx = \sin x\Big|_0^{\pi} = \sin \pi - \sin 0 = 0$$



$$8b)\quad \frac{1}{\ln 5 + 1}\int_{-1}^{\ln 5} \frac{e^x}{\pi}\,dx = \frac{\pi}{\ln 5 + 1}\int_{-1}^{\ln 5} e^x\,dx = \frac{\pi}{\ln 5 + 1}\left(e^x\Big|_{-1}^{\ln 5}\right)$$

$$\frac{\pi}{\ln 5 + 1}\left(5 - \frac{1}{e}\right) \doteq .565$$

9) $a = 3\,m/s^2$

$t = 4\,s \quad s(t) = 40\,m$

$s(t) = s_0 + v_0 t + \frac{1}{2} a t^2$

$40 = 0 + 4v_0 + (1.5)(16)$

$v_0 = 4\,m/s$

10) $= 2\int as\,ds = 2a\int s\,ds = 2a\,\frac{s^2}{2} = as^2 + C$