$\frac{\sin}{\cos}$ $\Big/_{0}^{\frac{\pi}{2}}$

Gavin McKay

$800 \cdot 9.8 \cdot 10 = 78{,}400$

1. $F = \boxed{\int_0^{10} (9.8 \cdot 15)(10-y)\,dy + 78{,}400}$

2. $y = \frac{x^2}{16}$ $\quad 16y = x^2 \quad \pm 4\sqrt{y} = x$

$w = 2\cdot(4\sqrt{y})$

$= 8(\sqrt{y})$

$\boxed{F = \int_0^{25} 1000 \cdot 9.8(8\sqrt{y})(y-25)\,dy}$

3. $\int_0^1 \frac{x^2}{1+x^6} = \int_0^1 \frac{x^2}{1+(x^3)^2}\,dx$ $\quad u = x^3$

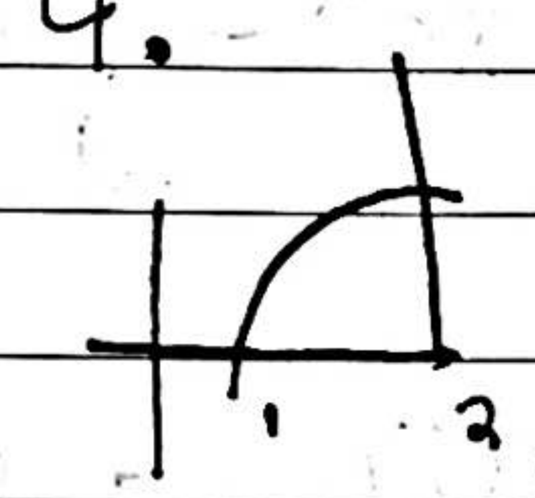
$du = 3x^2\,dx$

$\frac{1}{3}du = x^2\,dx$

$\frac{1}{3}\int_0^1 \frac{1}{1+u^2}\,du \quad \frac{1}{3}\arctan u \Big|_0^1 \quad \left(\frac{1}{3}\cdot\frac{\pi}{4}\right) - \left(0\cdot\frac{1}{3}\right)$

$\boxed{= \frac{\pi}{12}}$

4. $y = \ln x \quad y = 0 \quad x = 2$



$2\pi\int_0^2 (x\ln x)\,dx$

ILATE

$u = \ln x \quad du = \frac{1}{x}\,dx$

$dv = x\,dx \quad v = \frac{1}{2}x^2$

$2\pi\left(\frac{1}{2}x^2\ln x\Big|_1^2 - \int \frac{1}{x}\cdot\frac{x^2}{2}\right) = 2\pi\left(\frac{1}{2}x^2\ln x\Big|_1^2 - \int_1^2 \frac{x}{2}\,dx\right)$

$\frac{x^2}{2}\cdot\frac{1}{2}$

$2\pi\left(\left(\frac{1}{2}x^2\ln x\right)\Big|_1^2 - \frac{x^2}{4}\Big|_1^2\right)$

$2\pi\left((2\ln 2 - 0) - \left(1 - \frac{1}{4}\right)\right) = \boxed{2\pi\left(2\ln 2 - \frac{3}{4}\right)}$