$\left(\frac{x^2}{2}+1\right)$ $\frac{x^4}{4}+\frac{x^2}{2}+\frac{x^2}{2}+1$

Gavin McKay

1. $A(x)=60$

$$\int_0^3 \left(1000\, g \cdot 60\,(3-y)\right) dy$$

2. $$\int_0^6 \left(3g\,(6-y)\right) dy \qquad \rho=3$$

3. $f(x)=\frac{1}{6}(x^2+4)^{\frac{3}{2}}$ $\quad f'(x)=\frac{1}{4}(x^2+4)^{\frac{1}{2}}\cdot 2x$

$=\frac{x}{2}\sqrt{x^2+4}$

$f'(x)^2=\frac{x^2}{4}(x^2+4)$ $\quad f'(x)^2=\frac{x^4}{4}+x^2$

A. $$\int_0^3 \sqrt{1+\frac{x^4}{4}+x^2}\,dx = \int_0^3 \sqrt{\frac{x^4}{4}+x^2+1}\,dx$$

$$=\int_0^3 \sqrt{\left(\frac{x^2}{2}+1\right)^2}\,dx = \int_0^3 \left(\frac{1}{2}x^2+1\right) dx$$

$27 + 18 = 45$

B. $$=\frac{\frac{1}{\cancel{6}}x^3}{\cancel{3}}+x\,\Big|_0^3 \quad \frac{27}{6}+\frac{18}{6} = \boxed{\frac{45}{6}}$$

Gavin McRay

4. $f(x) = \tan x \qquad f'(x) = \sec^2 x \qquad f'(x)^2 = \sec^4 x$

$$2\pi \int_0^{\frac{\pi}{4}} \tan x \cdot \sqrt{1 + \sec^4 x}\, dx$$