

1. Integrate the following.

(a) $\int_1^{e^\pi} \frac{\sin(\ln x)}{x} dx$

(b) $\int \frac{x + \sqrt{1+x}}{1+x} dx$

(c) $\int \frac{\cos(1 + \ln x)}{x} dx$

(d) $\int \frac{x}{\sqrt{1-3x^2}} dx$

(e) $\int_1^4 \frac{\sqrt{x} + x^5 - 2x}{x^2} dx$

(f) $\int x^5 (\sqrt{x} - 1)^2 dx$

2. The region bounded by the graphs of $y = x^2$ and the line $y = 3x$, below the line $y = 4$, is rotated about the x -axis. Find the volume of the resulting solid.

3. The region bounded by the graphs of $y = x^2$ and the line $y = 3x$, below the line $y = 4$, is rotated about the y -axis. Find the volume of the resulting solid.