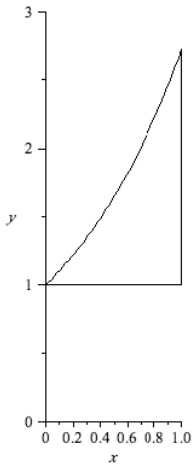
1. Find the average value of the function $f(x) = x\cos(2x)$ on the interval $0 \le x \le \frac{\pi}{4}$.

a) $\frac{1}{2\pi}$ b) $\frac{1}{2} - \frac{1}{\pi}$ c) $\frac{1}{2} - \frac{1}{2\pi}$ d) $1 - \frac{1}{\pi}$ e) $\frac{1}{4} - \frac{1}{2\pi}$ f) $\frac{1}{4} - \frac{1}{\pi}$

2. Find the volume of the solid obtained by rotating the region bounded by the curves $y = e^x$, $y = 1$, $x = 1$ about the x-axis.

a) $\frac{\pi}{2}\left(e^2 - 3\right)$ b) $\frac{\pi}{4}\left(e^2 - 1\right)$ c) $\pi\left(e^2 - 1\right)$

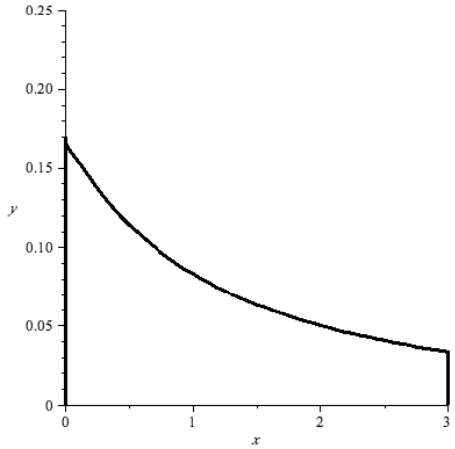
d) $\pi\left(e^2 - 3\right)$ e) $\frac{\pi}{2}\left(e^2 - 1\right)$ f) $\frac{\pi}{4}\left(e^2 - 3\right)$



3. What is the volume of the solid of revolution generated by rotating about the y-axis the region enclosed by the graph of $\dfrac{1}{x^2+5x+6}$, the x-axis and the lines $x = 0$ and $x = 3$.

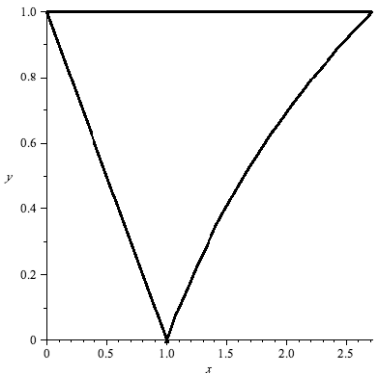
a) $2\pi(3\ln 6 - 2\ln 5)$ b) $2\pi(3\ln 6 - 2\ln 2)$ c) $2\pi(3\ln 3 - 2\ln 5)$

d) $2\pi(3\ln 5 - 2\ln 3)$ e) $2\pi(5\ln 2 - 2\ln 5)$ f) $2\pi(5\ln 2 - 3\ln 3)$



4. Calculate the area of the region bounded by the curves $y = \ln x$, $x + y = 1$ and $y = 1$.

a) $e - \frac{1}{4}$ b) $\frac{e}{2} + \frac{1}{2}$ c) $\frac{e}{2} - \frac{1}{2}$ d) $\frac{e}{2} - \frac{3}{2}$ e) $e - \frac{1}{2}$ f) $e - \frac{3}{2}$



5. Evaluate: $\int_0^e \frac{x^3}{3} \ln x \, dx$

a) $\frac{e^2}{2}$ b) $\frac{e^2}{2} - \frac{1}{2}$ c) $\frac{e^4}{36} + \frac{1}{32}$

d) $\frac{e^4}{36}$ e) $\frac{e^4}{16} - \frac{1}{4}$ e) $\frac{e^4}{16}$

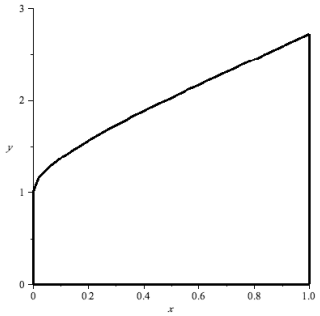
6. Evaluate: $\int_4^{\infty} \frac{dx}{x^2 - 6x + 10}$

a) $\frac{\sqrt{3}}{2} + \frac{1}{2}$ b) $\frac{\sqrt{3}}{2} + \frac{1}{4}$ c) $\frac{\sqrt{3}}{4} + \frac{1}{4}$ d) $\frac{\pi}{2}$ e) $\frac{\pi}{4}$ f) diverges

7. Evaluate: $\int_0^2 \sqrt{16 - x^2}\, dx$

a) $\frac{\sqrt{3}}{2} + \frac{8\pi}{2}$ b) $\sqrt{3} + \frac{8\pi}{3}$ c) $2\sqrt{3} + \frac{8\pi}{3}$

d) $\frac{\sqrt{3}}{2} + \frac{4\pi}{3}$ e) $\sqrt{3} + \frac{4\pi}{3}$ f) $2\sqrt{3} + \frac{4\pi}{3}$

8. Find the volume of the solid of revolution obtained by revolving the region between the graph of $y = e^{\sqrt{x}}$ and the x-axis for $0 \le x \le 1$ around the x-axis.

a) $\frac{\pi}{2}(e-1)$ b) $\frac{\pi}{2}(e^2-1)$ c) $\frac{\pi}{2}(e+1)$ d) $\frac{\pi}{2}(e^2+1)$ e) $\frac{\pi}{2}(e-3)$ f) $\frac{\pi}{2}(e^2-3)$