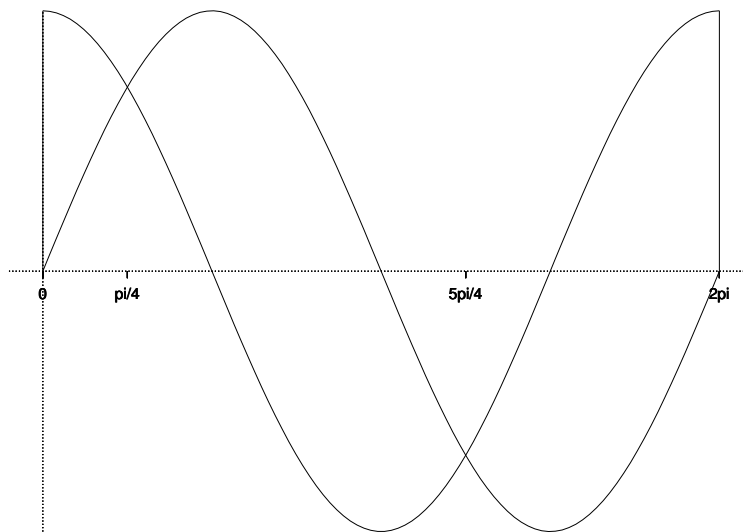
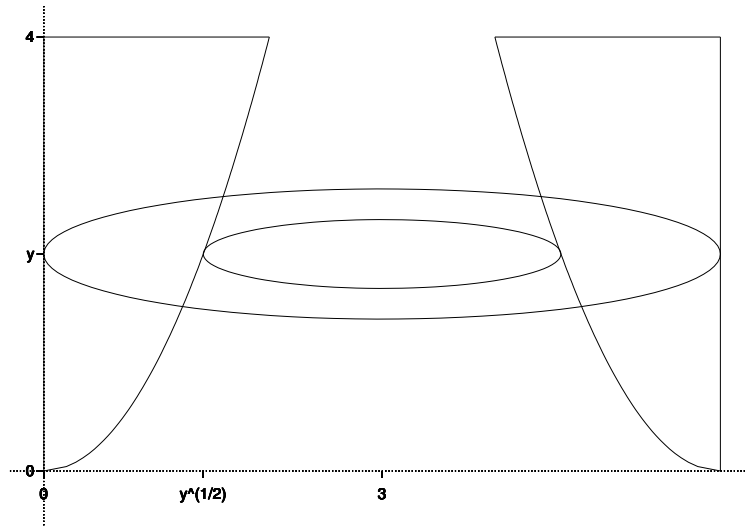


2005 Fall MTH142
Midterm Exam 2 Answers

1. (a) $e^{\sin x} + C$
(b) $\frac{1}{2}\sqrt{x^4 + 7} + C$
(c) $\frac{1}{2}(\ln(7x))^2 + C$
(d) $\frac{2}{25}(x^5 + 7)^{\frac{5}{2}} - \frac{14}{15}(x^5 + 7)^{\frac{3}{2}} + C$

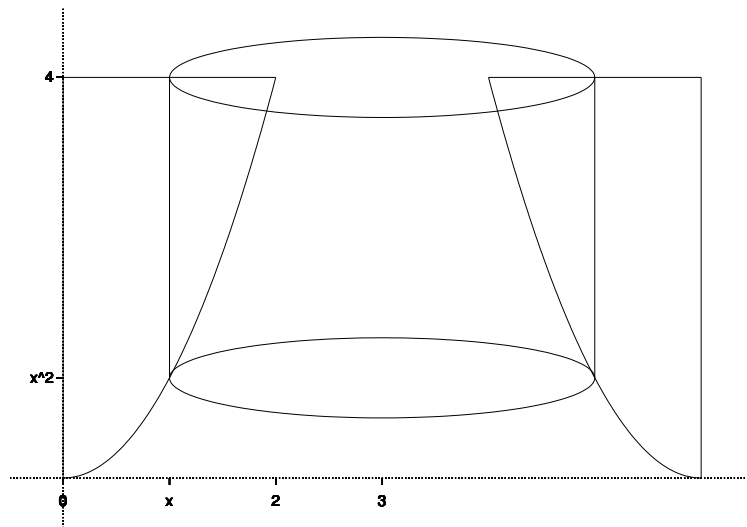


2. (a)
(b) $\int_0^{\frac{\pi}{4}} (\cos x - \sin x) dx + \int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} (\sin x - \cos x) dx + \int_{\frac{5\pi}{4}}^{2\pi} (\cos x - \sin x) dx$



3. (a)

(b) $\int_0^4 \left(\pi(3-0)^2 - \pi(3-\sqrt{y})^2 \right) dy$



(c)

(d) $\int_0^2 2\pi(3-x)(4-x^2) dx$

4. (a) $F(x) = 300x$

(b) $\int_{0.13}^{0.27} 300x dx$

- volume of cross-section at height y = $\pi(3)^2 dy$
 mass of cross-section at height y = $1000 \cdot \pi(3)^2 dy$
 weight of cross-section at height y = $9.8 \cdot 1000 \cdot \pi(3)^2 dy$
 5. work done lifting cross-section at height y = $(10 - y) \cdot 9.8 \cdot 1000 \cdot \pi(3)^2 dy$
 work done lifting all the water = $\int_0^8 (10 - y) \cdot 9.8 \cdot 1000 \cdot \pi(3)^2 dy$
6. (a) 15
 (b) $\sqrt{3}$
7. (a) $-x \cos x + \sin x + C$
 (b) $\frac{1}{10}x^{10} \ln x - \frac{1}{100}x^{10} + C$
 (c) $x^2 e^x - 2x e^x + 2e^x + C$
 (d) $\frac{1}{2}e^x (\sin x - \cos x) + C$