

Answers to Math 125 Spring 2007 Final

1. a. $\frac{\pi^2}{64} + \frac{\pi}{16} - \frac{1}{8}$

b. $-\frac{1}{2} \ln|x-1| - \frac{4}{x-1} + \frac{1}{2} \ln|x+1| + C$

2. a. $\frac{3}{2} \sin^{-1}(x-1) - \frac{1}{2}(x-1)\sqrt{1-(x-1)^2} - 2\sqrt{1-(x-1)^2} + C$

b. $\frac{2}{15}(w^3-1)^{5/2} + \frac{2}{9}(w^3-1)^{3/2} + C$

3. $G'(x) = \frac{1}{\sqrt{\pi}} \frac{\sqrt{x}}{x} e^{-x}$

4. a. $s(t) = 2\sin t - t + \pi$

b. $2\sqrt{3} + \frac{\pi}{3}$

5. a. $2\pi \int_0^{7/2} y(4y - y^2 - \frac{1}{2}y) dy$ (shells)

b. $\pi \int_0^{7/2} (4y - y^2 + 2)^2 - (\frac{1}{2}y + 2)^2 dy$ (cross sections)

6. 8 feet

7. a. $\int_0^1 \sqrt{1 + 4x^2 e^{-2x^2}} dx$

b. $\frac{1}{12} \left[1 + 4\sqrt{1 + \frac{1}{4}e^{-1/8}} + 2\sqrt{1 + e^{-1/2}} + 4\sqrt{1 + \frac{9}{4}e^{-9/8}} + \sqrt{1 + 4e^{-2}} \right]$

8. a. $2\frac{2}{3}$

b. coordinates of centroid = $(2, 1.845)$

9. $y = (9 \ln(x) + 3x^2 + 5)^{1/3}$

10. cake will be 100°F after $-\frac{30 \ln(3/4)}{\ln 2} \approx 66.67$ minutes