Math 125 F - Autumn 2006
Mid-Term Exam Number One
October 19, 2006
Answers

Version A (problem 1a integrand is $|2x - 6|$)

1. (a) 10

    (b) -13/6

    (c) $2\sqrt{2}$-1/2

2. (a) $\frac{2}{7}(x + 3)^{7/2} - \frac{12}{5}(x + 3)^{5/2} + 6(x + 3)^{3/2} + C$

    (b) $\frac{1}{3}\sin(3x - 8) + C$

    (c) $\ln|\sec \ln x| + C$

3. 0.163205

4. $f(x) = -\ln|x| + 3x + 7 + \ln 2$

5. (a) 2155132 J

    (b) The hole can be $\dfrac{5}{\sqrt{2}}$ meters deep.

6. (a) $\ln 3 - \dfrac{4}{9}$

    (b) volume $= \displaystyle\int_{1}^{3} \left(\pi \left(\frac{1}{x}\right)^2 - \pi \left(\frac{1}{9}x\right)^2 \right) dx$

    (c) volume $= \displaystyle\int_{1}^{3} 2\pi(x + 2) \left(\frac{1}{x} - \frac{1}{9}x \right) dx$

Version B (problem 1a integrand is $|2x - 8|$)

1. (a) 17

    (b) -73/6

    (c) $2\sqrt{2}$-1/2

2. (a) $\frac{2}{7}(x + 4)^{7/2} - \frac{16}{5}(x + 4)^{5/2} - \frac{32}{3}(x + 4)^{3/2} + C$

    (b) $\frac{1}{2}\sin(2x + 9) + C$

    (c) $\ln|\sec \ln x| + C$

3. 0.163205

4. $f(x) = -\ln|x| + 6x + 15 + \ln 2$

5. (a) 2376033 J

   (b) The hole can be $\dfrac{7}{\sqrt{2}}$ meters deep.

6. (a) $\ln 2 - \dfrac{3}{8}$

   (b) volume $= \displaystyle\int_1^2 \left(\pi \left(\frac{1}{x} \right)^2 - \pi \left(\frac{1}{4}x \right)^2 \right) dx$

   (c) volume $= \displaystyle\int_1^2 2\pi(x+2) \left(\frac{1}{x} - \frac{1}{4}x \right) dx$