

Math 125C Spring 2024
Mid-Term Exam Number One
April 18, 2024
Answers

There were two versions.

Version A

The integrand in problem 1(a) of Version A is $x(x+1)(x+2)$.

1. (a) $\frac{1}{4}x^4 + x^3 + x^2 + C$
(b) $\frac{3^x}{\ln 3} - 4e^x + 5 \tan x + C$
(c) $2 \ln |e^x + x^2| + C = 2 \ln(e^x + x^2) + C$
2. (a) $4 + \cos 4 - \cos 1$
(b) $10 + \pi$
(c) $\frac{1}{10}(2x+4)^{5/2} - \frac{2}{3}(2x+4)^{3/2} + C$
 $= \frac{1}{15}(2x+4)^{3/2}(3x-4) + C$
3. 319 meters
4. $2 + \ln 4 - \ln 9$
5. (a) $V = \int_0^4 (\pi(5-2)^2 - \pi(5-3)^2) dy + \int_4^9 (\pi(5-\sqrt{y})^2 - \pi(5-3)^2) dy$
(b) $V = 2\pi \int_2^3 (5-x)x^2 dx$
(c) $V = 2\pi \cdot \frac{185}{12} = 96.865773\dots$
6. 1.23387119...

Version B

The integrand of problem 1(a) of Version B is $x(x-1)(x+2)$.

1. (a) $\frac{1}{4}x^4 + \frac{1}{3}x^3 - x^2 + C$
(b) $5e^x - \frac{2^x}{\ln x} + 6 \tan x + C$
(c) $3 \ln |x^2 - e^x| + C$
2. (a) $4 - \cos 2 + \cos 5$
(b) $4 + \frac{\pi}{4}$
(c) $\frac{1}{10}(2x+1)^{5/2} - \frac{1}{6}(2x+1)^{3/2} + C$
 $= \frac{1}{15}(2x+1)^{3/2}(3x-1) + C$
3. $274\frac{2}{3}$ meters
4. $6 - \ln 16$
5. (a) $V = \int_0^1 (\pi(5-1)^2 - \pi(5-2)^2) dy + \int_1^4 (\pi(5-\sqrt{y})^2 - \pi(5-2)^2) dy$
(b) $V = \int_1^2 (5-x)x^2 dx$
(c) $V = 2\pi \cdot \frac{95}{12} = 49.74188368\dots$
6. 5.201782853...