King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102
Exam II
231
November 07, 2023
Net Time Allowed: 120 Minutes

MASTER VERSION

Example 3 / Section 7.3

1. The volume of the solid formed by revolving the region bounded by the graphs of $y = x^2 + 1$, $y = 0$, $x = 0$ and $x = 1$ about the y-axis is:
(Hint: The Shell Method is preferable in this question)

(a) $\frac{3\pi}{2}$ (correct)

(b) $\frac{5\pi}{2}$

(c) $\frac{\pi}{2}$

(d) $\frac{7\pi}{2}$

(e) $\frac{9\pi}{2}$

Q33 / Section 8.1

2. $\int_0^1 \frac{2}{e^{-x}+1}\,dx =$

(a) $2\ln\left(\frac{e+1}{2}\right)$ (correct)

(b) $\ln\left(\frac{e+1}{2}\right)$

(c) $2\ln\left(\frac{e-1}{2}\right)$

(d) $\ln\left(\frac{e-1}{2}\right)$

(e) $2\ln\left(\frac{e+2}{2}\right)$

Q31/ Section 8.2

3. $\int \arctan x \, dx =$

(a) $x \arctan x - \frac{1}{2}\ln(1+x^2) + c$ (correct)

(b) $x \arctan x + \frac{1}{2}\ln(1+x^2) + c$

(c) $x^2 \arctan x - \frac{1}{2}\ln(1+x^2) + c$

(d) $x \arctan x - \frac{1}{2}\ln(1+x) + c$

(e) $x \arctan x - \frac{1}{2}\ln(x^2) + c$

Example 1 / Section 8.3

4. If $\int \sin^3 x \, \cos^4 x \, dx = -\frac{1}{5}(\cos x)^m + \frac{1}{7}(\cos x)^n + c$, then $m + n =$

(a) 12 (correct)

(b) 14

(c) 13

(d) 11

(e) 10

Q46 / Section 8.3

5. $\int_0^{\frac{\pi}{2}} \sin 8x \cos 7x \, dx =$

(a) $\frac{8}{15}$ (correct)

(b) $-\frac{8}{15}$

(c) $\frac{3}{5}$

(d) $-\frac{3}{15}$

(e) $\frac{2}{3}$

Example 7/ Section 7.4

6. The area of the surface formed by revolving the graph of $f(x) = x^2$ on the interval $[0, \sqrt{2}]$ about the y-axis is:

(a) $\frac{13\pi}{3}$ (correct)

(b) $\frac{14\pi}{3}$

(c) $\frac{16\pi}{3}$

(d) $\frac{11\pi}{3}$

(e) $\frac{10\pi}{3}$

Q22 / Section 8.2

7. $\int \frac{\ln x}{x^3}\,dx =$

(a) $\frac{-\ln x}{2x^2} - \frac{1}{4x^2} + c$ (correct)

(b) $\frac{\ln x}{2x^2} + \frac{1}{4x^2} + c$

(c) $\frac{-\ln x}{2x^2} - \frac{1}{2x^2} + c$

(d) $\frac{-\ln x}{x^2} - \frac{1}{4x^2} + c$

(e) $\frac{-\ln x}{2x^2} + \frac{1}{4x^2} + c$

Q7 / Section 8.4

8. $\int \frac{dx}{\sqrt{x^2-25}} =$

(a) $\ln|x + \sqrt{x^2-25}| + c$ (correct)

(b) $\ln|x - \sqrt{x^2-25}| + c$

(c) $\ln\left|\frac{x}{5} + \sqrt{x^2-25}\right| + c$

(d) $\ln\left|\frac{x}{5} - \sqrt{x^2-25}\right| + c$

(e) $\ln\left|x - \frac{\sqrt{x^2-25}}{5}\right| + c$

Example 2 / Section 8.5

9. $\displaystyle\int \frac{5x^2+20x+6}{x^3+2x^2+x}\,dx =$

(a) $\ln\left|\frac{x^6}{x+1}\right| - \frac{9}{x+1} + c$ (correct)

(b) $\ln\left|\frac{x^5}{x+1}\right| - \frac{9}{x+1} + c$

(c) $\ln\left|\frac{x^4}{x+1}\right| - \frac{8}{x+1} + c$

(d) $6\ln|x| - \frac{8}{(x+1)^2} + c$

(e) $\ln\left|\frac{x^6}{x+1}\right| - \frac{8}{(x+1)^2} + c$

Q16 / Section 8.5

10. If $\frac{6x}{x^3-8} = \frac{A}{x-2} + \frac{Bx+C}{x^2+2x+4}$, then $A+B+C =$

(a) 2 (correct)

(b) 3

(c) 1

(d) -1

(e) 0

Q57 / Section 8.7

11. $\displaystyle\int_0^{\frac{\pi}{2}} \frac{d\theta}{1+\sin\theta+\cos\theta} =$

(a) $\ln 2$ (correct)

(b) $\ln 3$

(c) $2\ln 2$

(d) $2\ln 3$

(e) $\ln 5$

Example 5 / Section 8.3

12. If $\displaystyle\int \sec^4 3x\, \tan^3 3x\, dx = \frac{\tan^4 3x}{A} + \frac{\tan^6 3x}{B} + C$, then $A + B =$

(a) 30 (correct)

(b) 6

(c) 28

(d) 26

(e) 32

Q17/ Section 7.2

13. The volume of the solid generated by revolving the region bounded by the graphs of the equations $y = x$, $y = 3$ and $x = 0$ about the line $y = 4$ is

(a) $18\,\pi$ (correct)

(b) $17\,\pi$

(c) $16\,\pi$

(d) $19\,\pi$

(e) $20\,\pi$

Q73 / Section 7.2

14. The base of a solid is the region bounded by the graphs of $y = x+1$ and $y = x^2-1$. If the cross sections of the solid perpendicular to the x-axis are squares, then the volume of the solid is equal to:

(a) $\int_{-1}^{2} (x^4 - 2x^3 - 3x^2 + 4x + 4)\,dx$ (correct)

(b) $\int_{-2}^{1} (x^4 - 2x^3 - 3x^2 + 4x + 4)\,dx$

(c) $\int_{-1}^{2} (x^4 + 2x^3 + 3x^2 + 4x + 4)\,dx$

(d) $\int_{-1}^{-2} (x^4 + 2x^3 + 3x^2 + 4x + 4)\,dx$

(e) $\int_{-1}^{2} (x^4 - 2x^3 - 3x^2 - 4x + 4)\,dx$

Example 2 / Section 7.4

15. The arc length of the graph of $y = \dfrac{x^3}{6} + \dfrac{1}{2x}$ on the interval $\left[\dfrac{1}{2}, 2\right]$ is:

(a) $\dfrac{33}{16}$ (correct)

(b) $\dfrac{31}{16}$

(c) $\dfrac{29}{16}$

(d) $\dfrac{27}{16}$

(e) $\dfrac{35}{16}$

Q63 / Section 8.2

16. If $\displaystyle\int \sin\sqrt{x}\,dx = a\sqrt{x}\cos\sqrt{x} + b\sin\sqrt{x} + c$, then $a + b =$

(a) 0 (correct)

(b) 4

(c) 1

(d) -1

(e) -4

Q33/ Section 8.4

17. $\int \frac{x}{\sqrt{4x-x^2}}\,dx =$

(a) $2\arcsin\left(\frac{x-2}{2}\right) - \sqrt{4x-x^2} + c$ (correct)

(b) $\arcsin\left(\frac{x-2}{2}\right) - \sqrt{4x-x^2} + c$

(c) $\arccos\left(\frac{x-2}{2}\right) - \sqrt{4x-x^2} + c$

(d) $2\arcsin\left(\frac{x-2}{2}\right) + \sqrt{4x-x^2} + c$

(e) $2\arccos\left(\frac{x-2}{2}\right) - \sqrt{4x-x^2} + c$

Q27 / Section 8.5

18. $\int \frac{\sec^2 x}{\tan^2 x + 5\tan x + 6}\,dx =$

(a) $\ln\left|\frac{\tan x + 2}{\tan x + 3}\right| + c$ (correct)

(b) $\ln\left|\frac{\tan x - 2}{\tan x + 3}\right| + c$

(c) $\ln\left|\frac{\tan x + 2}{\tan x - 3}\right| + c$

(d) $\ln\left|\frac{\tan x - 2}{\tan x - 3}\right| + c$

(e) $\frac{\tan x + 2}{\tan x + 3} + c$

Math 102, 231, Exam II **Answer KEY**

Q	MASTER	CODE01	CODE02	CODE03	CODE04
1	A	D $_{4}$	A $_{3}$	C $_{1}$	E $_{3}$
2	A	D $_{5}$	B $_{4}$	A $_{3}$	B $_{2}$
3	A	A $_{3}$	C $_{5}$	A $_{5}$	C $_{5}$
4	A	C $_{2}$	B $_{2}$	A $_{2}$	A $_{1}$
5	A	E $_{1}$	E $_{1}$	C $_{4}$	A $_{4}$
6	A	B $_{10}$	A $_{12}$	B $_{10}$	A $_{12}$
7	A	A $_{11}$	A $_{6}$	E $_{9}$	A $_{7}$
8	A	C $_{6}$	B $_{8}$	B $_{11}$	D $_{6}$
9	A	A $_{9}$	A $_{11}$	E $_{6}$	E $_{10}$
10	A	C $_{12}$	E $_{10}$	A $_{7}$	B $_{11}$
11	A	D $_{7}$	D $_{9}$	B $_{12}$	E $_{9}$
12	A	B $_{8}$	A $_{7}$	E $_{8}$	D $_{8}$
13	A	C $_{16}$	E $_{14}$	C $_{18}$	D $_{16}$
14	A	E $_{15}$	B $_{13}$	B $_{13}$	D $_{17}$
15	A	D $_{17}$	C $_{18}$	B $_{14}$	B $_{14}$
16	A	C $_{14}$	E $_{15}$	B $_{17}$	D $_{15}$
17	A	E $_{18}$	D $_{16}$	E $_{16}$	E $_{13}$
18	A	E $_{13}$	D $_{17}$	E $_{15}$	C $_{18}$