1. The volume of the solid generated by revolving the region bounded by the graphs: $y = \sqrt{x}$, $y = -\frac{1}{2}x + 4$, $x = 0$, $x = 8$ about the x-axis is equal to:

   (a) $48\,\pi$ _____(correct)

   (b) $44\,\pi$

   (c) $52\,\pi$

   (d) $56\,\pi$

   (e) $42\,\pi$

2. The volume of the solid generated by revolving about the y-axis the region bounded by the graphs:

   $$y = x^{\frac{3}{2}},\ y = 8,\ x = 0$$

   is equal to:

   (a) $\frac{384}{7}\pi$ _____(correct)

   (b) $\frac{200}{7}\pi$

   (c) $\frac{196}{7}\pi$

   (d) $\frac{199}{7}\pi$

   (e) $\frac{219}{7}\pi$

3. The arc length of the graph of $f(x) = \ln(\sin x)$ over $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$ is equal to

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

(b) $\ln(\sqrt{2}+1)$

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

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

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

4. $\int x^3\sqrt{x^4+1}\,dx =$

(a) $\frac{1}{6}(x^4+1)^{\frac{3}{2}}+c$ (correct)

(b) $\frac{1}{12}(x^4+1)^{\frac{3}{2}}+c$

(c) $\frac{3}{8}(x^4+1)^{\frac{3}{2}}+c$

(d) $\frac{2}{3}(x^4+1)^{\frac{3}{2}}+c$

(e) $\frac{3}{10}(x^4+1)^{\frac{3}{2}}+c$

5. $\int \frac{e}{e^{-x}+1}\,dx =$

(a) $e\ln(1+e^x)+c$ _____ (correct)

(b) $\ln(e^{-x}+e)+c$

(c) $\ln(e^{-x}+x)+c$

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

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

6. $\int_0^1 2\sin^{-1}x\,dx =$

(a) $\pi-2$ _____ (correct)

(b) $\frac{\pi}{2}-1$

(c) $2\sin^{-1}(1)$

(d) $\frac{\sin^{-1}(1)}{2}$

(e) $\pi+1$

7. $\int_0^3 xe^{\frac{x}{2}}\,dx =$

(a) $4 + 2e^{\frac{3}{2}}$ (correct)

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

(c) $3e^{\frac{3}{2}} - 1$

(d) $2e^{\frac{3}{2}} - 1$

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

8. $\int \sin^4 x\,dx =$

(a) $\frac{3}{8}x - \frac{1}{4}\sin 2x + \frac{1}{32}\sin 4x + c$ (correct)

(b) $4x - \frac{3}{4}\sin 2x - \frac{1}{16}\sin 4x + c$

(c) $\frac{1}{4}x + \frac{1}{4}\sin 2x + \frac{1}{8}\sin 4x + c$

(d) $x - \frac{1}{2}\sin 2x - \frac{1}{16}\sin 4x + c$

(e) $\frac{5}{8}x + \frac{1}{8}\sin 2x - \frac{1}{16}\sin 4x + c$

9. $\displaystyle\int \frac{\tan^2 x}{\sec^5 x}\,dx =$

(a) $\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 x + c$ (correct)

(b) $\frac{1}{5}\cos^3 x - \frac{1}{3}\sin^5 x + c$

(c) $\frac{1}{3}\tan^3 x - \frac{1}{7}\tan^6 x + c$

(d) $\frac{1}{\sqrt{3}}\sin^3 x - \frac{1}{6}\sin^6 x + c$

(e) $\frac{1}{\sqrt{3}}\cos^3 x - \frac{1}{5}\sin^5 x + c$

10. $\displaystyle\int \frac{x^3}{\sqrt{16-x^2}}\,dx =$

(a) $-\frac{1}{3}\sqrt{16-x^2}\,(32+x^2) + c$ (correct)

(b) $-16\sqrt{16-x^2} + x\sqrt{(16-x^2)^3} + c$

(c) $\frac{1}{64}\sqrt{16-x^2}\,(x^3+16) + c$

(d) $-4\sqrt{16-x^2}\,(16-x^2) + c$

(e) $4\sqrt{16-x^2} + (16-x^2)^{\frac{5}{2}} + c$

11. $\int \frac{dx}{(x^2+5)^{3/2}} =$

(a) $\frac{x}{5\sqrt{x^2+5}} + c$ (correct)

(b) $\frac{\sqrt{5}}{5}\sqrt[x]{x^2+5} + c$

(c) $\frac{1}{5x\sqrt{x^2+5}} + c$

(d) $\frac{5x}{\sqrt{x^2+25}} + c$

(e) $\frac{1}{5}x\sqrt{x^2+25} + c$

12. $\int \frac{9-x^2}{7x^3+x}\,dx =$

(a) $9\ln|x| - \frac{32}{7}\ln(1+7x^2) + c$ (correct)

(b) $18\ln|x| - \frac{9}{7}\ln(1+7x^2) + c$

(c) $\frac{7}{9}\ln(7x^3+x) - x + c$

(d) $7\ln|3-x| + 9\ln|3+x| + \ln|x| + c$

(e) $7\ln(1+7x^2) + 9x + c$

13. $\int \cot^2 x \, dx =$

(a) $-\cot x - x + c$ _____ (correct)

(b) $\dfrac{\cot^3 x}{3} + c$

(c) $-\cot x + \csc x + c$

(d) $-\csc x - 2x + c$

(e) $\csc x - 2x + c$

14. $\displaystyle\int_e^{e^2} \ln x \, dx =$

(a) e^2 _____ (correct)

(b) $e^2 - e$

(c) $e^2 + e$

(d) $\dfrac{e^2 + e}{2}$

(e) $\dfrac{e^2 - e}{2}$

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

(a) $\pi \ln 2$ (correct)

(b) $\ln 2$

(c) $\dfrac{1}{\pi}\ln\left(\dfrac{\pi^3}{4}\right)$

(d) $\dfrac{1}{2}\ln\left(\dfrac{\pi^2}{2}\right)$

(e) $\dfrac{1}{e}\ln(2\pi)$

16. The surface area that is generated when $f(x) = 3x$ over $[0,3]$ is revolved about x-axis is equal to:

(a) $27\pi\sqrt{10}$ (correct)

(b) $10\pi\sqrt{10}$

(c) $9\pi\sqrt{10}$

(d) $36\pi\sqrt{10}$

(e) $29\pi\sqrt{10}$

17. Suppose that $f(a) = f(b) = 0$ and the second derivative of f exist on the Interval $[a, b]$, then the value of $\int_a^b (x-a)(x-b)f''(x)\,dx =$

(a) $2\int_a^b f(x)\,dx$ _____(correct)

(b) $(b-a)\int_a^b f(x)\,dx$

(c) $\frac{b+a}{2}\int_a^b f(-x)\,dx$

(d) $(b-a)\int_a^b f(-x)\,dx$

(e) $\frac{ab}{2}\int_a^b f(x)\,dx$

18. If the integral $\int \tan^5\frac{x}{2}\,dx$, is written in the form,

$$\int \tan^5\frac{x}{2}\,dx = a\tan^4\frac{x}{2} + b\tan^2\frac{x}{2} + c\ln|\cos\frac{x}{2}| + C$$

Then the value of $a+b+c =$

(a) $-\frac{5}{2}$ _____(correct)

(b) $-\frac{3}{2}$

(c) 0

(d) $-\frac{1}{2}$

(e) $-\frac{7}{2}$

Math 102, 232, Major Exam II

Answer KEY

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

Answer Counts

V	A	B	C	D	E
1	5	3	3	3	4
2	4	3	2	2	7
3	8	1	1	3	5
4	5	3	1	6	3