1. Using four rectangles and midpoints, the area under the graph of $f(x)=x^2+2x$ from $x=0$ to $x=8$ is approximately equal

   (a) 116

   (b) 232

   (c) 102

   (d) 223

   (e) 320

2. $\int \frac{(x+1)^2}{\sqrt[3]{x}}\,dx =$

   (a) $\frac{3}{8}x^{\frac{8}{3}}+\frac{6}{5}x^{\frac{5}{3}}+\frac{3}{2}x^{\frac{2}{3}}+C$

   (b) $\frac{3}{8}x^{\frac{8}{3}}+\frac{3}{5}x^{\frac{5}{3}}+\frac{3}{2}x^{\frac{2}{3}}+C$

   (c) $\frac{1}{2}(x+1)^3\cdot x^{\frac{2}{3}}+C$

   (d) $\frac{3}{5}x^{\frac{5}{3}}+\frac{3}{2}x^{\frac{2}{3}}+C$

   (e) $\frac{1}{8}x^{\frac{8}{3}}-\frac{3}{7}x^{\frac{7}{4}}+\frac{1}{2}x^{\frac{2}{3}}+C$

3. $\int_0^{\frac{\pi}{4}} \frac{1+\sin\theta}{\cos^2\theta}\, d\theta =$

(a) $2\sqrt{2}$

(b) $\sqrt{2}-1$

(c) $\sqrt{2}$

(d) $\sqrt{2}+1$

(e) $\frac{1}{2}\sqrt{2}$

4. $\frac{d}{dx}\left[\int_{\sqrt{x}}^{2} \cos\left(t^2\right) dt\right] =$

(a) $\frac{\cos x}{\sqrt{x}}$

(b) $\cos 4 - \cos x$

(c) $\sin 4 - \sin x$

(d) $\frac{\sin 4}{4} - \frac{\sin x}{2\sqrt{x}}$

(e) $-\frac{\cos x}{2\sqrt{x}}$

5. $\int_{-5}^{0} \left(2x - 4\sqrt{25 - x^2}\right) dx =$

(a) 25π

(b) $-25(1+\pi)$

(c) $-25\left(1+\frac{\pi}{4}\right)$

(d) $25(1-\pi)$

(e) $25 - \frac{\pi}{4}$

6. The area of the region bounded by the curves $y^2 - x = 4$ and $y^2 + x = 2$ is equal to

(a) 4

(b) 6

(c) $4\sqrt{3}$

(d) $8\sqrt{3}$

(e) 3

7. $\sum_{i=1}^{n}\left(5-\frac{4i}{n}\right)=$

(a) $2n^2+3n$

(b) $3-2n$

(c) $3n-2n^2$

(d) $2n^2+4n+1$

(e) $3n-2$

8. $\lim_{n\to+\infty}\frac{1}{n}\left(\sqrt[3]{\frac{1}{n}}+\sqrt[3]{\frac{2}{n}}+\sqrt[3]{\frac{3}{n}}+\ldots+\sqrt[3]{\frac{n}{n}}\right)=$

[Hint: First express the limit as a definite integral]

(a) $\frac{3}{4}$

(b) 0

(c) $\sqrt[3]{4}$

(d) 1

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

9. Which one of the following statements is **FALSE**: (f is continuous on $[a,b]$)

(a) If $f(x) \le 0$ on $[a,b]$, then $\int_a^b f(x)dx \le 0$.

(b) $\int_a^b 4f(x)dx = 4\int_a^b f(x)dx$.

(c) If $\int_a^b f(x)dx = 7$, then $\int_a^b f(t)dt = 7$.

(d) If $\int_a^b f(x)dx = 0$, then $f(x) = 0$ for all x in $[a,b]$

(e) $\int_a^b f(x)dx + \int_b^a f(x)dx = 0$.

10. The area of the region between the curves $y = \sin x$ and $y = \dfrac{1}{2}$ from $x = 0$ to $x = \dfrac{\pi}{2}$ is equal to

(a) $\sqrt{2} - \dfrac{\pi}{12} + 2$

(b) $\sqrt{3} + \dfrac{\pi}{12} - 1$

(c) $\sqrt{3} - \dfrac{\pi}{12} - 1$

(d) $\sqrt{3} - \dfrac{\pi}{6} - 2$

(e) $\sqrt{2} - \dfrac{\pi}{2} + 1$

11. $\int_1^4 \frac{e^{\sqrt{x}} \cos\left(e^{\sqrt{x}}\right)}{\sqrt{x}} dx =$

(a) $4\cos e$

(b) $2\left(\cos e - \cos e^2\right)$

(c) $2\left(\sin e^2 - \sin e\right)$

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

(e) $4\sin e$

12. The volume of the solid obtained by rotating the region bounded by the curves $y = x^3$, $y = 1$, and $x = 0$ about the y-axis is equal to

(a) $\frac{3\pi}{7}$

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

(c) $\frac{3\pi}{4}$

(d) $\frac{2\pi}{3}$

(e) $\frac{3\pi}{5}$

13. A particle moves along a line so that its velocity at time t is $v(t) = \sin t$ (measured in meters per second). The distance traveled by the particle during the time period $0 \le t \le \frac{3\pi}{2}$ is equal to

(a) 3 meters

(b) 2 meters

(c) 1 meters

(d) $\frac{3}{2}$ meters

(e) $\frac{1}{2}$ meters

14. If $15 + \int_3^x e^{-t} f(t)\, dt = 5x$ for all x, then $f(0) + f'(0) =$

(a) $15e$

(b) $5e$

(c) 3

(d) 10

(e) 5

15. If f is continuous on $[0,1]$ and $\int_0^1 f(x)\,dx = 2$, then $\int_0^1 f(1-x)\,dx =$

(a) -2

(b) 1

(c) 0

(d) -1

(e) 2

16. The volume of the solid generated by revolving the region bounded by the parabolas $y = x^2$ and $y^2 = 8x$ about the line $y = -1$ is given by

(a) $\pi \int_0^2 \left(8x - x^4\right)\,dx$

(b) $\pi \int_0^2 \left[\left(\sqrt{8x}+1\right)^2 - \left(x^2+1\right)^2\right]dx$

(c) $\pi \int_0^{16} \left[\left(\sqrt{y}+1\right)^2 - \left(\frac{1}{8}y^2+1\right)^2\right]dy$

(d) $\pi \int_0^{16} \left[\left(\sqrt{y}-1\right)^2 - \left(\frac{1}{8}y^2-1\right)^2\right]dy$

(e) $\pi \int_0^2 \left(\sqrt{8x} - x^2\right)^2\,dx$

17. $\displaystyle\int_1^e \frac{1}{x + x\ln x}\,dx =$

(a) $\ln 2$

(b) $\ln(1+e)$

(c) $\dfrac{e}{2}$

(d) $2+e$

(e) e

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

(a) $\dfrac{2}{2}\cos^2 x + 3\sin x + \dfrac{1}{2}x + C$

(b) $\ln\,|2\tan\,x + x\,\sec x| + C$

(c) $\dfrac{\sec x}{\sec x + \tan x} + C$

(d) $\ln\,|\sin\,x| + \ln|\,x\,| + C$

(e) $\ln\,|2\,\sin\,x + x| + C$

19. $\int_{-\pi}^{\pi} x^5 \cos\left(x^2\right) dx =$

(a) $\frac{1}{4}\cos\left(\pi^2\right)$

(b) $32\sin\left(\pi^2\right)$

(c) 0

(d) π^6

(e) $4\pi^2\sin\left(\pi^2\right)$

20. A solid has a base lying in the first quadrant and is bounded by the curves $y = 1 - \frac{1}{4}x^2$, $x = 0$, and $y = 0$. If the cross sections of the solid perpendicular to the x-axis are squares, then the volume of the solid is equal to

(a) $\frac{16}{15}$

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

(c) $\frac{14}{15}$

(d) $\frac{11}{15}$

(e) $\frac{17}{15}$

Math 102, Exam I, Term 083

ANSWER KEY

Question	Code 1	Code 2	Code 3	Code 4
1	b	c	e	b
2	a	d	b	a
3	c	b	a	c
4	e	e	e	a
5	b	a	d	e
6	d	a	c	d
7	e	b	c	d
8	a	c	a	e
9	d	e	b	d
10	c	d	e	a
11	c	c	d	b
12	e	b	c	b
13	a	e	a	c
14	d	a	e	e
15	e	c	b	a
16	b	a	d	b
17	a	e	a	d
18	e	d	e	c
19	c	a	c	b
20	a	b	b	e