1. $\displaystyle\int_0^1 \frac{\sin^{-1} x}{\sqrt{1-x^2}}\, dx =$

(a) $\dfrac{\pi^2}{8}$

(b) $\dfrac{\pi}{4}$

(c) $\dfrac{\pi^2}{2}$

(d) $\dfrac{\pi}{6}$

(e) $\dfrac{\pi^2}{4}$

2. If $f(x) = \displaystyle\int_{x^2}^1 \frac{t}{1+t}\, dt$, then $f'\left(\dfrac{1}{2}\right) =$

(a) $-\dfrac{1}{5}$

(b) $\dfrac{1}{5}$

(c) $-\dfrac{1}{3}$

(d) $\dfrac{1}{3}$

(e) $\dfrac{1}{4}$

3. Using two rectangles and taking the sample points to be the midpoints, then the estimate of the area under the graph of $f(x) = \sin x$ from $x = 0$ to $x = \pi$ is equal to

(a) $\dfrac{\pi\sqrt{2}}{2}$

(b) $\dfrac{\pi\sqrt{2}}{4}$

(c) $\dfrac{\pi\sqrt{3}}{2}$

(d) $\dfrac{\pi\sqrt{3}}{4}$

(e) 0

4. The length of the curve $y = \ln(\sec x)$, $0 \leq x \leq \dfrac{\pi}{4}$ is equal to

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

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

(c) 0

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

(e) $2\ln\sqrt{2}$

5. $\displaystyle\int \frac{5}{(3x-1)(x+2)}\,dx =$

(a) $\dfrac{5}{7}\ln\left|\dfrac{3x-1}{x+2}\right| + c$

(b) $\dfrac{1}{7}\ln\left|\dfrac{3x-1}{x+2}\right| + c$

(c) $\dfrac{7}{5}\ln\left|\dfrac{x+2}{3x-1}\right| + c$

(d) $\dfrac{3}{5}\ln\left|\dfrac{x+2}{3x-1}\right| + c$

(e) $\dfrac{2}{5}\ln\left|\dfrac{3x-1}{x+2}\right| + c$

6. $\displaystyle\int x\,3^{-x}\,dx =$

(a) $\dfrac{-x\,3^{-x}}{\ln 3} - \dfrac{3^{-x}}{(\ln 3)^2} + c$

(b) $\dfrac{x\,3^{-x}}{\ln 3} + \dfrac{3^{-x}}{(\ln 3)^2} + c$

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

(d) $\dfrac{x}{3^x} - \dfrac{\ln 3}{3^x} + c$

(e) $x\,\ln 3 + \dfrac{3^x}{\ln 3} + c$

7. The area of the region enclosed by the curves $y = 12 - x^2$ and $y = x^2 - 6$ is equal to

(a) 72

(b) 70

(c) 68

(d) 66

(e) 64

8. The sequence $\left\{\tan\left(\dfrac{2n\,\pi}{1+8\,n}\right)\right\}_{n=1}^{\infty}$

(a) converges to 1

(b) converges to 0

(c) converges to -1

(d) diverges

(e) converges to $\dfrac{\pi}{2}$

9. The sum of the series

$$1 + 0.4 + 0.16 + 0.064 + \ldots$$

is equal to

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

(b) $\frac{7}{3}$

(c) $\frac{9}{2}$

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

(e) $\frac{5}{2}$

10. The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^5}$ is

(a) a convergent alternating series

(b) a convergent $p-$ series

(c) a divergent $p-$ series

(d) a convergent geometric series

(e) a divergent geometric series

11. $\int_0^2 x^2 \sqrt{4 - x^2}\, dx =$

(a) π

(b) $2\,\pi$

(c) $3\,\pi$

(d) $\dfrac{\pi}{4}$

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

12. How many terms of the series $\sum_{n=1}^{\infty} \dfrac{(-1)^{n+1}}{n^2}$ do we need to add so that $|\text{error}| < 0.0001$

(a) 100

(b) 98

(c) 96

(d) 94

(e) 92

13. $\int \cot^5 \theta \ \sin^4 \theta \, d\theta =$

(a) $\ln|\sin\theta| - \sin^2\theta + \dfrac{1}{4}\sin^4\theta + c$

(b) $\ln|\sin\theta| + \sin^3\theta + \sin^4\theta + c$

(c) $\ln|\sin\theta| - \sin^3\theta - \sin^4\theta + c$

(d) $\ln|\sin\theta| + 2\sin^2\theta - \dfrac{1}{3}\sin^3\theta + c$

(e) $\ln|\sin\theta| - \sin^2\theta + \sin^4\theta + c$

14. The area of the surface obtained by rotating the curve $x = \dfrac{1}{3}(y^2+2)^{3/2}$, $1 \le y \le 2$ about the x-axis is equal to

(a) $\dfrac{21\pi}{2}$

(b) $\dfrac{19\pi}{2}$

(c) $\dfrac{23\pi}{2}$

(d) $\dfrac{17\pi}{2}$

(e) $\dfrac{15\pi}{2}$

15. The series $\sum_{k=1}^{\infty} \frac{k \sin^2 k}{1+k^3}$ is

(a) convergent by using the comparison test with $\sum_{k=1}^{\infty} \frac{1}{k^2}$

(b) convergent by using the comparison test with $\sum_{k=1}^{\infty} \frac{1}{k}$

(c) divergent by using the limit comparison test with $\sum_{k=1}^{\infty} \frac{1}{k^2}$

(d) convergent by using the limit comparison test with $\sum_{k=1}^{\infty} \frac{1}{k}$

(e) divergent by the integral test

16. The interval of convergence of the series

$$\sum_{n=1}^{\infty} \frac{(x+1)^n}{n\, 2^n}$$

is

(a) $I = [-3, 1)$

(b) $I = (-3, 1]$

(c) $I = (-3, 1)$

(d) $I = [-3, 1]$

(e) $I = [-3, 0)$

17. Which one of the following series is divergent?

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}\, n}{n+1}$

(b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

(c) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}}$

(d) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\, n}{n^2+1}$

(e) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}$

18. Using the definition of Taylor series, the first three nonzero terms of the series for $f(x) = \sin x$ centered at $a = \frac{\pi}{6}$ is

(a) $\frac{1}{2} + \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right) - \frac{1}{4}\left(x - \frac{\pi}{6}\right)^2$

(b) $\frac{1}{2} - \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right) + \frac{1}{2}\left(x - \frac{\pi}{6}\right)^2$

(c) $\frac{1}{2} + \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right) + \frac{1}{8}\left(x - \frac{\pi}{6}\right)^2$

(d) $\frac{1}{2} - \frac{\sqrt{3}}{4}\left(x - \frac{\pi}{6}\right) + \frac{1}{2}\left(x - \frac{\pi}{6}\right)^2$

(e) $\frac{1}{2} + \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right) - \frac{1}{8}\left(x - \frac{\pi}{6}\right)^2$

19. The Maclaurin Series for the function

$$f(x) = \frac{x^2}{3-x}$$

is

(a) $\sum_{n=0}^{\infty} \frac{x^{n+2}}{3^{n+1}}, \ |x| < 3$

(b) $\sum_{n=0}^{\infty} \frac{x^{n+1}}{3^{n-1}}, \ |x| < 3$

(c) $\sum_{n=0}^{\infty} \frac{x^{2n}}{3^{n}}, \ |x| < 3$

(d) $\sum_{n=0}^{\infty} \frac{x^{2n+1}}{3^{n+1}}, \ |x| < 3$

(e) $\sum_{n=0}^{\infty} \frac{(-1)^n \, x^{n+1}}{3^{n+1}}$

20. The improper integral $\int_0^3 \frac{dx}{x-1}$ is

(a) divergent

(b) convergent and equals $2 \ln 3$

(c) convergent and equals $\ln 3$

(d) convergent and equals $3 \ln 3$

(e) convergent and equals $4 \ln 3$

21. Using the cylindrical shells method, the volume of the solid generated by revolving about the x-axis the region bounded by the three curves $y = -x + 2$, $y = x^2$ and $y = 0$ is given by

(a) $v = 2\pi \int_0^1 y\,(2 - y - \sqrt{y})\,dy$

(b) $v = 2\pi \int_0^1 y\,(2 - y + \sqrt{y})\,dy$

(c) $v = \pi \int_0^1 y\,[x^4 - (2 - x)^2]\,dx$

(d) $v = \pi \int_0^1 [(2 - x)^2 - x^4]\,dx$

(e) $v = 2\pi \int_0^1 y\,(2 + y - \sqrt{y})\,dy$

22. $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n\,\pi^{2n-1}}{3^{2n-1}\,(2n)!} =$

(a) $\dfrac{3}{2\pi}$

(b) $\dfrac{\sqrt{3}}{2}\,\pi$

(c) $\dfrac{-\sqrt{3}}{2}\,\pi$

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

(e) $\dfrac{5}{\pi}$

23. $\int \cos\sqrt{x}\,dx =$

(a) $2\sqrt{x}\,\sin\sqrt{x} + 2\,\cos\sqrt{x} + c$

(b) $2\sqrt{x}\,\sin\sqrt{x} - 3\,\cos\sqrt{x} + c$

(c) $3\sqrt{x}\,\sin\sqrt{x} + 2\,\cos\sqrt{x} + c$

(d) $-3\sqrt{x}\,\sin\sqrt{x} + 3\,\cos\sqrt{x} + c$

(e) $\sqrt{x}\,\sin\sqrt{x} - 2\,\cos\sqrt{x} + c$

24. $\int_0^1 x^2\, e^{-x^4}\,dx =$

(a) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!\,(4n+3)}$

(b) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!\,(4n+1)}$

(c) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!\,(4n-3)}$

(d) $\sum_{n=0}^{\infty} \frac{(-1)^n}{(4n)\,!}$

(e) $\sum_{n=0}^{\infty} \frac{(-1)^n}{(4n)\,!(n+1)}$

25. The volume of the solid generated by rotating the region under the curve $y = 2\sin x,\ 0 \le x \le \pi$ around the x-axis is equal to

(a) $2\pi^2$

(b) 2π

(c) $3\pi^2$

(d) 4π

(e) $5\pi^2$

26. The series $\sum_{n=1}^{\infty} \dfrac{(-1)^n\, 2^n\, n!}{(7)(12)(17)\ldots(5n+2)}$ is

(a) convergent by the ratio test

(b) divergent by the ratio test

(c) a series for which the ratio test is inconclusive

(d) divergent by the root test

(e) conditionally convergent

27. $\lim_{n\to\infty} \dfrac{1^2 + 2^2 + \ldots + n^2}{3n^3 + 1} =$

(a) $\dfrac{1}{9}$

(b) $\dfrac{1}{3}$

(c) 0

(d) $\dfrac{2}{9}$

(e) ∞

28. Using the integral test, the series $\sum_{n=1}^{\infty} n(1+n^2)^p$ is convergent if

(a) $p < -1$

(b) $p < 1$

(c) $p > 1$

(d) $p > -1$

(e) $p = 0$

Answer KEY

Q	MM	V1	V2	V3	V4
1	a	a	b	b	c
2	a	b	a	e	c
3	a	a	c	e	c
4	a	e	b	e	b
5	a	d	d	d	d
6	a	d	c	d	e
7	a	b	d	e	c
8	a	a	e	c	e
9	a	d	b	a	c
10	a	b	a	c	a
11	a	d	b	a	c
12	a	a	b	e	d
13	a	c	a	e	e
14	a	d	c	e	c
15	a	d	b	c	a
16	a	e	b	a	a
17	a	b	c	a	a
18	a	e	e	a	b
19	a	c	e	e	a
20	a	a	c	c	a
21	a	a	b	d	a
22	a	c	d	e	b
23	a	d	c	a	b
24	a	b	b	d	c
25	a	a	c	b	a
26	a	c	e	d	b
27	a	a	a	a	d
28	a	e	c	b	a