1. Using the Midpoint Rule with $n = 3$, the approximation of the area of the region bounded by the graph of $f(x) = \sin x$ and the x-axis for $0 \le x \le \pi$ is equal to

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

(b) $\dfrac{3\pi}{4}$

(c) $\dfrac{3\pi}{5}$

(d) $\left(\dfrac{\sqrt{3}+1}{2}\right)\pi$

(e) $(\sqrt{3}+1)\,\pi$

Similar to Example #8 page 302

2. On the interval $[0, 2\sqrt{3}]$, $\displaystyle\lim_{\|\Delta\|\to 0} \sum_{i=1}^{n} c_i\sqrt{c_i^2+4}\,\Delta x_i =$

(a) $\dfrac{56}{3}$ ________________________________ (correct)

(b) $20\sqrt{3}$

(c) 24

(d) 20

(e) $24\sqrt{3}$

Similar to Q#12 page 313

3. $\int_{-1}^{6} |5 - 2x|\, dx =$

(a) $\frac{49}{2}$ ________________ (correct)

(b) $\frac{39}{2}$

(c) $\frac{45}{2}$

(d) $\frac{65}{4}$

(e) $\frac{73}{4}$

Q # 21 page 328

4. $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} (\sin^3 x \cos x + \sec^2 x \tan^2 x)\, dx =$

(a) $2\sqrt{3}$ ________________ (correct)

(b) 0

(c) $\sqrt{3}$

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

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

Similar to Example # 10 page 340 and Q # 42 page 341

5. The area of the surface formed by revolving the graph of $y = \sqrt{25 - x^2}$, $-1 \le x \le 4$ about the x-axis is equal to

(a) $50\,\pi$ ______________________________ (correct)

(b) $60\,\pi$

(c) $55\,\pi$

(d) $65\,\pi$

(e) $45\,\pi$

Q # 30 page 512

6. $\displaystyle\int \cos^3(x)\,\sin^4(x)\,dx =$

(a) $\dfrac{\sin^5(x)}{5} - \dfrac{\sin^7(x)}{7} + C$ ______________________________ (correct)

(b) $-\dfrac{\sin^5(x)}{5} + \dfrac{\sin^7(x)}{7} + C$

(c) $\dfrac{\sin^5(x)}{5} - \dfrac{\sin^3(x)}{3} + C$

(d) $-\dfrac{\sin^5(x)}{5} + \dfrac{\sin^3(x)}{3} + C$

(e) $\dfrac{\sin^9(x)}{5} - \dfrac{\sin^8(x)}{7} + C$

Q # 5 page 538

7. The improper integral $\displaystyle\int_0^5 \frac{10}{x}\,dx$

(a) diverges ______________________________ (correct)
(b) converges to $\ln 5$
(c) converges to $2\ln 5$
(d) converges to $10\ln 5$
(e) converges to $5\ln 5$

Q #34 page 579

8. The sequence $\left\{\dfrac{n^3+1}{n^2+1}\right\}_{n=1}^{\infty}$ is

(a) monotonic but not bounded ______________________________ (correct)
(b) bounded but not monotonic
(c) monotonic and bounded
(d) neither monotonic nor bounded
(e) convergent

Similar to Example # 9(b) page 595

9. The sequence $\left\{ \dfrac{1+(-1)^n}{n^3} \right\}_{n=1}^{\infty}$

(a) converges to 0 ________________________________ (correct)

(b) converges to 1

(c) converges to -1

(d) diverges

(e) is not bounded

Similar to Q#32 page 596

10. Which of the following statements is true about the two series
(I). $\displaystyle\sum_{n=1}^{\infty} \ln\left(\frac{n+1}{n}\right)$, (II). $\displaystyle\sum_{n=1}^{\infty} (\sin 2)^n$

Similar to Q#37 page 605 and Q#58 page 606

(a) (I) is a divergent series but (II) is a convergent series ____________ (correct)

(b) (I) is a convergent series but (II) is a divergent series

(c) Both series are convergent

(d) Both series are divergent

(e) The sequence of partial sums of (I) is decreasing

11. The first three terms of the Taylor series generated by the function $f(x) = \dfrac{1}{4-x}$ centered at $c = 2$ are

(a) $\frac{1}{2} + \frac{1}{4}(x-2) + \frac{1}{8}(x-2)^2$ ______________________________(correct)

(b) $\frac{1}{2} + \frac{1}{8}(x-2) + \frac{1}{16}(x-2)^2$

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

(d) $2 + 2(x-4) - 4(x-4)^2$

(e) $\frac{1}{2} - \frac{1}{4}(x-2) + \frac{1}{16}(x-2)^2$

Similar to Q# 10
page 677

12. The geometric series $6 - 3 + \frac{3}{2} - \frac{3}{4} + \dots$

(a) is convergent and its sum is 4 ______________________________(correct)

(b) is convergent and its sum is 5

(c) is convergent and its sum is $\frac{7}{2}$

(d) is convergent and its sum is $\frac{9}{2}$

(e) is divergent

Similar to Q #33,34
page 605

13. The series $\sum_{n=2}^{\infty} \frac{n^2}{n^3+1}$ is

(a) divergent by the Integral Test ______________________ (correct)

(b) divergent by the n^th-Term Test

(c) convergent by the Integral Test

(d) convergent by the Comparison Test

(e) convergent by the Limit Comparison Test

Similar to Example # 1 page 610

14. The series $\sum_{n=1}^{\infty} \frac{1}{1+2+3+4+\ldots n}$

(a) converges by the limit comparison test ______________________ (correct)

(b) diverges by the integral test

(c) converges by the ratio test

(d) diverges by the n^{th} term test for divergence

(e) diverges by the comparison test

Q # 68 page 622

15. The series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt[3]{n}}{n+1}$

(a) converges conditionally ______________________________ (correct)

(b) converges absolutely

(c) diverges

(d) is not bounded

(e) is monotonic

Similar to Q#25 page 629

16. Which of the following statements is true about the two series
(I). $\displaystyle\sum_{n=0}^{\infty} \frac{(n!)^3}{(3n)!}$, (II). $\displaystyle\sum_{n=1}^{\infty} \left(\frac{\ln n}{n}\right)^n$

(a) Both series converge ______________________________ (correct)

(b) The series (I) converges but the series (II) diverges

(c) The series (I) diverges but the series (II) converges

(d) Both series diverge

(e) The sequence of partial sums of (II) is not monotonic

Similar to Q#34 page 637 and Q#50 page 638

17. Using a fourth Maclaurin polynomial of the function $f(x) = e^{4x}$, the approximation of the value of e is equal to

(a) $\frac{65}{24}$ ____(correct)

Q # 39 page 649

(b) $\frac{67}{24}$

(c) $\frac{63}{24}$

(d) $\frac{61}{24}$

(e) $\frac{69}{24}$

18. The interval of convergence of the power series $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1}$ is

(a) $[-1, 1]$ ____(correct)

Q # 30 page 658

(b) $(-1, 1]$

(c) $[-1, 1)$

(d) $(-1, 1)$

(e) $(-\infty, \infty)$

19. A power series centered at 0 for $f(x) = \dfrac{2x+1}{x^2-1}$ is

(a) $-\sum_{n=0}^{\infty}(x^{2n} + 2x^{(2n+1)})$ ______ (correct)

(b) $\sum_{n=0}^{\infty}(x^{2n} - 2x^{(2n+1)})$

(c) $\sum_{n=0}^{\infty}(2x^{2n} - x^{(2n+1)})$

(d) $\sum_{n=0}^{\infty}(-2x^{2n} + x^{(2n+1)})$

(e) $\sum_{n=0}^{\infty}(x^{2n} + 2x^{(2n+1)})$

Similar to Example #3 page 663

Or $f(x) = -(2x+1)\left(\frac{1}{1-x^2}\right)$

$= -(2x+1)\sum_{n=0}^{\infty}(x^2)^n$

$= -(2x+1)\sum_{n=0}^{\infty} x^{2n}$

$= -\sum_{n=0}^{\infty}(2x^{2n+1} + x^{2n})$

20. The Maclaurin Series for the function $f(x) = e^{\frac{x^2}{2}}$ is

(a) $\sum_{n=0}^{\infty}\dfrac{x^{2n}}{2^n\, n!}$ ______ (correct)

Q # 27 page 677

(b) $\sum_{n=0}^{\infty}\dfrac{x^{n^2}}{2^n\, n!}$

(c) $\sum_{n=0}^{\infty}\dfrac{x^{2n}}{2^{n+1}\, n!}$

(d) $\sum_{n=0}^{\infty}\dfrac{x^{2n}}{n!}$

(e) $\sum_{n=0}^{\infty}\dfrac{(-1)^n x^{2n}}{2^n\, n!}$

Math 102, 233, Final Exam **Answer KEY**

Q	MASTER	CODE01	CODE02	CODE03	CODE04
1	A	C_{4}	C_{5}	C_{3}	C_{20}
2	A	E_{19}	B_{4}	E_{18}	D_{12}
3	A	C_{15}	D_{19}	E_{14}	D_{6}
4	A	D_{10}	C_{20}	B_{13}	E_{18}
5	A	B_{2}	C_{2}	C_{17}	C_{10}
6	A	E_{16}	B_{13}	E_{11}	D_{13}
7	A	E_{20}	E_{1}	A_{19}	B_{11}
8	A	A_{6}	B_{3}	B_{9}	A_{2}
9	A	C_{8}	B_{14}	D_{16}	A_{4}
10	A	C_{7}	A_{17}	E_{10}	D_{8}
11	A	B_{14}	B_{18}	A_{1}	E_{5}
12	A	D_{11}	D_{8}	C_{7}	B_{1}
13	A	B_{18}	D_{10}	C_{12}	A_{3}
14	A	B_{13}	C_{12}	B_{2}	A_{9}
15	A	C_{17}	C_{9}	E_{20}	B_{19}
16	A	D_{3}	B_{15}	D_{5}	B_{16}
17	A	B_{12}	D_{16}	D_{8}	A_{17}
18	A	C_{5}	E_{6}	E_{4}	A_{15}
19	A	D_{1}	C_{11}	B_{15}	B_{7}
20	A	E_{9}	C_{7}	E_{6}	C_{14}