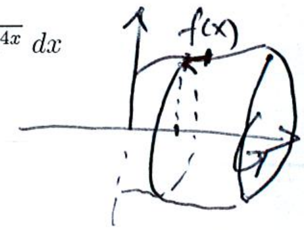
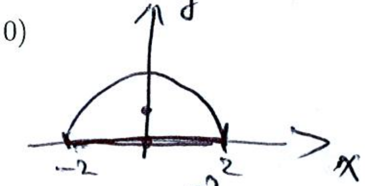
26. If the curve $y = e^{2x}$, $0 \le x \le 1$, is revolved about the y–axis, then the area of the surface obtained is



A. $\displaystyle\int_0^1 2\pi\sqrt{1+4e^{4x}}\,dx$ B. $\displaystyle\int_0^1 2\pi e^{2x}\sqrt{1+e^{2x}}\,dx$ C. $\displaystyle\int_0^1 2\pi x\sqrt{1+4e^{4x}}\,dx$

D. $\displaystyle\int_0^1 2\pi e^{2x}\sqrt{1+4e^{4x}}$ E. $\displaystyle\int_0^1 2\pi e^{4x}\sqrt{1+e^{4x}}\,dx$

27. Find the centroid $(\overline{x}, \overline{y})$ of the region bounded by the x–axis and the semicircle $y = \sqrt{4-x^2}$.



A. $\left(0, \dfrac{8}{3\pi}\right)$ B. $\left(\dfrac{8}{3\pi}, 0\right)$ C. $\left(0, \dfrac{2}{3\pi}\right)$ D. $\left(\dfrac{2}{3\pi}, 0\right)$ E. $(0,0)$

28. Evaluate $\displaystyle\lim_{n\to\infty}\left(1+\frac{(-1)^n}{n}\right)$.

A. 0 B. 1 C. −1 D. 2 E. The limit does not exist.

29. Evaluate $\displaystyle\lim_{n\to\infty}\left(n^{1/n}+\frac{1}{n!}\right)$.

A. 0 B. 1 C. e D. $1/e$ E. The limit does not exist.

30. $\displaystyle\sum_{n=0}^{\infty} 5\left(-\frac{4}{5}\right)^n =$

A. 1/9 B. 5/9 C. 25/9 D. 5 E. 25

31. If $L = \displaystyle\sum_{n=1}^{\infty}\frac{1}{2^n} + \sum_{n=0}^{\infty}\frac{(-1)^n}{2^n}$, then $L =$

A. 1/3 B. 2/3 C. 1 D. 4/3 E. 5/3

32. Find all values of p for which $\displaystyle\sum_{n=1}^{\infty}\frac{1}{(n^2+1)^p}$ converges.

A. $p > 1$ B. $p \le 1$ C. $p \ge 1$ D. $p > 1/2$ E. $p \le 1/2$

33. $\displaystyle\sum_{n=1}^{\infty}\left(1+\frac{1}{n}\right)^p$ converges for:

A. $p \le 1$ B. $p > 1$ C. $p < 0$ D. $p > 0$ E. No values of p.

34. Which of the following series converge conditionally?

(I) $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n}{n^2}$ (II) $\displaystyle\sum_{n=2}^{\infty}\frac{(-1)^n n}{\ln n}$ (III) $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n n}{e^n}$

A. II only. B. I and III only. C. I and II only. D. All three. E. None of them.

35. Which of the following series converge?

(I) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{1/4}}$ (II) $\sum_{n=1}^{\infty} \frac{n!}{1 \cdot 3 \cdot 5 \cdots (2n-1)}$ (III) $\sum_{n=1}^{\infty} \frac{4}{3}\left(\frac{1}{2}\right)^n$

A. II only. B. I and III only. C. I and II only. D. All three. E. None of them.

36. Find the interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{3^n x^n}{n \ln n}$.

A. $-\frac{1}{3} \le x < \frac{1}{3}$ B. $-\frac{1}{3} < x \le \frac{1}{3}$ C. $0 \le x \le \frac{1}{3}$ D. $-1 \le x < 1$ E. $-3 < x < 3$

37. Find the interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{n}{5^n}(x-2)^n$.

A. $-5 < x < 5$ B. $3 < x < 7$ C. $-2 < x < 2$ D. $-3 \le x < 7$ E. $-3 < x < 7$

38. Find the first three terms of the Maclaurin series of $f(x) = \ln(1+x)$

A. $x + \frac{x^2}{2} + \frac{x^3}{3}$ B. $x - \frac{x^2}{2} + \frac{x^3}{3}$ C. $x + \frac{x^2}{2!} + \frac{x^3}{3!}$ D. $x - \frac{x^2}{2!} + \frac{x^3}{3!}$ E. $x + \frac{2x^2}{3!} + \frac{3x^3}{4!}$

39. If $f(x) = \sum_{n=0}^{\infty} \frac{n^2(x-2)^n}{n+1}$, then $f^{(3)}(2) =$

A. $\frac{9}{24}$ B. $\frac{27}{2}$ C. 0 D. 27 E. $\frac{9}{4}$

40. $\int_0^x te^{t^3}\,dt =$

A. $\sum_{n=0}^{\infty} \frac{x^{2n}}{(2n)!}$ B. $\sum_{n=0}^{\infty} \frac{x^{3n}}{3n(n!)}$ C. $\sum_{n=0}^{\infty} \frac{x^{4n+1}}{(4n+1)!}$ D. $\sum_{n=0}^{\infty} \frac{x^{4n+1}}{(4n+1)(n!)}$ E. $\sum_{n=0}^{\infty} \frac{x^{3n+2}}{(3n+2)(n!)}$

41. Use the power series representation of $\sin x$ to find the first three terms of the Maclaurin series of $f(x) = x\sin(x^2)$

A. $x^3 + \frac{x^7}{3!} + \frac{x^{11}}{5!}$ B. $x + \frac{x^3}{3} + \frac{x^5}{5}$ C. $x^3 - \frac{x^7}{3!} + \frac{x^{11}}{5!}$ D. $x - \frac{x^3}{3} + \frac{x^5}{5}$ E. $x^3 - \frac{x^7}{3} + \frac{x^{11}}{5}$

42. Find the fourth term of the Maclaurin series of $f(x) = \frac{x^2+3}{x-1}$.

A. $-x^3$ B. $3x^3$ C. $-3x^3$ D. $-4x^3$ E. $4x^3$

43. The fourth term of the Taylor series of $f(x) = \ln x$, centered at $a = 2$, is

A. $\frac{1}{6}(x-2)^3$ B. $\frac{1}{12}(x-2)^3$ C. $\frac{1}{24}(x-2)^3$ D. $-\frac{1}{3}(x-2)^3$ E. $-(x-2)^3$

44. Using Maclaurin series and the Alternating Series Estimation Theorem, we can obtain the approximation

$$\int_0^{0.1} e^{-x^2}\,dx \approx \frac{1}{10} - \frac{1}{3000},$$

with error $\leq E$, where the value of E is

A. 10^{-5} B. 10^{-6} C. $\frac{1}{2}10^{-6}$ D. $\frac{1}{7}10^{-7}$ E. $\frac{1}{2}10^{-5}$

45. Parametric equations of a curve C are

$$x = 2\cos t, \qquad y = 3\sin t, \qquad 0 \leq t \leq \frac{\pi}{2}.$$

The curve C is:

A. A quarter of a circle. B. An ellipse. C. Half of an ellipse.
D. Half of a circle. E. A quarter of an ellipse.

46. Find the slope of the tangent line at the point $(2/3, 3)$ for the curve parameterized by $x = 2t^3/3,\ y = t^2 + 2t$.

A. 2/3 B. 2 C. 4/3 D. 4 E. 3

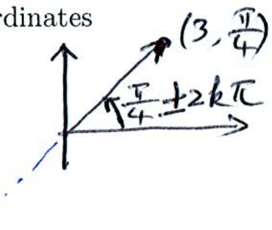
47. Find the length of the parametric curve

$$x = \frac{1}{2}t^2, \qquad y = 2 + \frac{1}{3}t^3, \qquad 0 \leq t \leq \sqrt{3}.$$

A. 21/4 B. 7/2 C. 7/3 D. 14/3 E. 8/3

48. A point P has polar coordinates $(3, \pi/4)$. Which of the following are also polar coordinates of P?

(I) $(-3, -\pi/4)$ (II) $(-3, 5\pi/4)$ (III) $(3, -7\pi/4)$ (IV) $(3, -5\pi/4)$



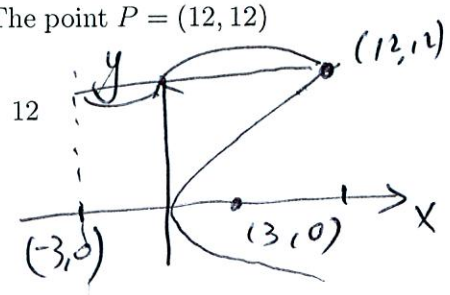
A. I and II only. B. I and III only. C. I and IV only.
D. II and III only. E. II and IV only.

49. The polar graph of $r = \dfrac{1}{\sin\theta + \cos\theta}$ is:

A. a parabola. B. a line. C. a cardioid. D. a rose. E. an ellipse.

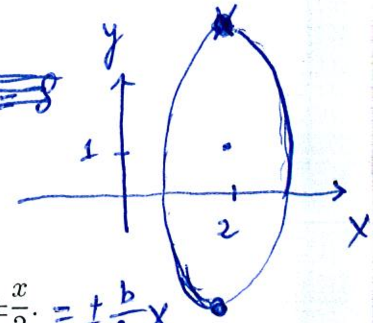
50. The graph of $y^2 = 12x$ is a parabola whose focus is the point $(3, 0)$. The point $P = (12, 12)$ lies on the parabola. Find the distance from P to the directrix.

A. $\sqrt{481}$ B. $\sqrt{425}$ C. $\sqrt{306}$ D. 15 E. 12



51. The ellipse $(x-2)^2 + \dfrac{(y-1)^2}{9} = 1$ has one vertex at

A. $(1, 5)$ B. $(5, 1)$ C. $(2, 1)$ D. $(2, 4)$ E. $(2, 10)$



52. Find an equation for the hyperbola with foci $(\pm 3, 0)$, and asymptotes $y = \pm \frac{x}{2}$.

A. $20y^2 - 5x^2 = 36$ B. $5x^2 - 20y^2 = 36$ C. $x^2 - 4y^2 = 4$
D. $4y^2 - x^2 = 4$ E. $5x^2 - 4y^2 = 1$

53. Write the complex number $\dfrac{3-4i}{1+2i}$ in the form $a + bi$.

A. $-1 - 2i$ B. $1 + 2i$ C. $2 - i$ D. $3 - 2i$ E. $3 + i$

54. Write the complex number $\sqrt{3} - i$ in polar form with argument between 0 and 2π.

A. $4\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)$ B. $2\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)$ C. $4\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$
D. $2\left(\cos\frac{11\pi}{6} + i\sin\frac{11\pi}{6}\right)$ E. $2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$

Answers

1. D; 2. C; 3. D; 4. A; 5. B; 6. E; 7. B; 8. E; 9. A; 10. B

11. C; 12. C; 13. A; 14. E; 15. B; 16. A; 17. D; 18. E; 19. B; 20. E

21. A; 22. A; 23. C; 24. A; 25. D; 26. C; 27. A; 28. B; 29. B; 30. C

31. E; 32. D; 33. E; 34. E; 35. D; 36. A; 37. E; 38. B; 39. B; 40. E

41. C; 42. D; 43. C; 44. B; 45. E; 46. B; 47. C; 48. D; 49. B; 50. D

51. D; 52. B; 53. A; 54. D