Multiple Choice First Semester BC Topics (Chapter 8)

1969

28. What is $\lim_{x\to 0}\frac{e^{2x}-1}{\tan x}$?

(A) -1 (B) 0 (C) 1 (D) 2 (E) The limit does not exist.

42. If $\int x^2\cos x\,dx = f(x)-\int 2x\sin x\,dx$, then $f(x)=$

(A) $2\sin x+2x\cos x+C$

(B) $x^2\sin x+C$

(C) $2x\cos x-x^2\sin x+C$

(D) $4\cos x-2x\sin x+C$

(E) $(2-x^2)\cos x-4\sin x+C$

1973

17. The number of bacteria in a culture is growing at a rate of $3{,}000e^{2t/5}$ per unit of time t. At $t=0$, the number of bacteria present was 7,500. Find the number present at $t=5$.

(A) $1{,}200e^2$ (B) $3{,}000e^2$ (C) $7{,}500e^2$ (D) $7{,}500e^5$ (E) $\frac{15{,}000}{7}e^7$

23. $\lim_{h\to 0}\frac{1}{h}\ln\left(\frac{2+h}{2}\right)$ is

(A) e^2 (B) 1 (C) $\frac{1}{2}$ (D) 0 (E) nonexistent

36. $\int_0^1\frac{x+1}{x^2+2x-3}dx$ is

(A) $-\ln\sqrt{3}$ (B) $-\frac{\ln\sqrt{3}}{2}$ (C) $\frac{1-\ln\sqrt{3}}{2}$ (D) $\ln\sqrt{3}$ (E) divergent

37. $\lim_{x\to 0}\frac{1-\cos^2(2x)}{x^2}=$

(A) -2 (B) 0 (C) 1 (D) 2 (E) 4

1985

12. $\int\frac{dx}{(x-1)(x+2)}=$

(A) $\frac{1}{3}\ln\left|\frac{x-1}{x+2}\right|+C$ (B) $\frac{1}{3}\ln\left|\frac{x+2}{x-1}\right|+C$ (C) $\frac{1}{3}\ln\left|(x-1)(x+2)\right|+C$

(D) $(\ln|x-1|)(\ln|x+2|)+C$ (E) $\ln\left|(x-1)(x+2)^2\right|+C$

23. $\lim_{h\to 0}\frac{\int_1^{1+h}\sqrt{x^5+8}\,dx}{h}$ is

(A) 0 (B) 1 (C) 3 (D) $2\sqrt{2}$ (E) nonexistent

36. $\int_{-1}^1\frac{3}{x^2}dx$ is

(A) -6 (B) -3 (C) 0 (D) 6 (E) nonexistent

38. $\lim_{x\to\infty}\left(1+5e^x\right)^{\frac{1}{x}}$ is

(A) 0 (B) 1 (C) e (D) e^5 (E) nonexistent

45. If n is a positive integer, then $\lim_{n\to\infty}\frac{1}{n}\left[\left(\frac{1}{n}\right)^2+\left(\frac{2}{n}\right)^2+\ldots+\left(\frac{3n}{n}\right)^2\right]$ can be expressed as

(A) $\int_0^1\frac{1}{x^2}dx$ (B) $3\int_0^1\left(\frac{1}{x}\right)^2dx$ (C) $\int_0^3\left(\frac{1}{x}\right)^2dx$

(D) $\int_0^3 x^2\,dx$ (E) $3\int_0^3 x^2\,dx$

1988

7. $\int_2^{+\infty}\frac{dx}{x^2}$ is

(A) $\frac{1}{2}$ (B) ln 2 (C) 1 (D) 2 (E) nonexistent

16. $\int xe^{2x}dx =$

(A) $\frac{xe^{2x}}{2}-\frac{e^{2x}}{4}+C$ (B) $\frac{xe^{2x}}{2}-\frac{e^{2x}}{2}+C$ (C) $\frac{xe^{2x}}{2}+\frac{e^{2x}}{4}+C$

(D) $\frac{xe^{2x}}{2}+\frac{e^{2x}}{2}+C$ (E) $\frac{x^2e^{2x}}{4}+C$

17. $\int_2^3 \frac{3}{(x-1)(x+2)}dx =$

(A) $-\frac{33}{20}$ (B) $-\frac{9}{20}$ (C) $\ln\left(\frac{5}{2}\right)$ (D) $\ln\left(\frac{8}{5}\right)$ (E) $\ln\left(\frac{2}{5}\right)$

35. If k is a positive integer, then $\lim_{x\to+\infty}\frac{x^k}{e^x}$ is

(A) 0 (B) 1 (C) e (D) $k!$ (E) nonexistent

43. Bacteria in a certain culture increase at a rate proportional to the number present. If the number of bacteria doubles in three hours, in how many hours will the number of bacteria triple?

(A) $\frac{3\ln 3}{\ln 2}$ (B) $\frac{2\ln 3}{\ln 2}$ (C) $\frac{\ln 3}{\ln 2}$ (D) $\ln\left(\frac{27}{2}\right)$ (E) $\ln\left(\frac{9}{2}\right)$

1993

11. $\int_4^\infty \frac{-2x}{\sqrt[3]{9-x^2}}dx$ is

(A) $7^{\frac{2}{3}}$ (B) $\frac{3}{2}\left(7^{\frac{2}{3}}\right)$ (C) $9^{\frac{2}{3}}+7^{\frac{2}{3}}$ (D) $\frac{3}{2}\left(9^{\frac{2}{3}}+7^{\frac{2}{3}}\right)$ (E) nonexistent

29. $\int x\sec^2 x\,dx =$

(A) $x\tan x+C$ (B) $\frac{x^2}{2}\tan x+C$ (C) $\sec^2 x+2\sec^2 x\tan x+C$

(D) $x\tan x-\ln|\cos x|+C$ (E) $x\tan x+\ln|\cos x|+C$

38. During a certain epidemic, the number of people that are infected at any time increases at a rate proportional to the number of people that are infected at that time. If 1,000 people are infected when the epidemic is first discovered, and 1,200 are infected 7 days later, how many people are infected 12 days after the epidemic is first discovered?

(A) 343 (B) 1,343 (C) 1,367 (D) 1,400 (E) 2,057

1997

11. $\int_1^\infty \frac{x}{(1+x^2)^2}dx$ is

(A) $-\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$ (E) divergent

16. $\lim_{h\to 0}\frac{e^h-1}{2h}$ is

(A) 0 (B) $\frac{1}{2}$ (C) 1 (D) e (E) nonexistent

84. $\int x^2\sin x\,dx =$

(A) $-x^2\cos x-2x\sin x-2\cos x+C$

(B) $-x^2\cos x+2x\sin x-2\cos x+C$

(C) $-x^2\cos x+2x\sin x+2\cos x+C$

(D) $-\frac{x^3}{3}\cos x+C$

(E) $2x\cos x+C$

86. $\int \frac{dx}{(x-1)(x+3)} =$

(A) $\frac{1}{4}\ln\left|\frac{x-1}{x+3}\right| + C$

(B) $\frac{1}{4}\ln\left|\frac{x+3}{x-1}\right| + C$

(C) $\frac{1}{2}\ln\left|(x-1)(x+3)\right| + C$

(D) $\frac{1}{2}\ln\left|\frac{2x+2}{(x-1)(x+3)}\right| + C$

(E) $\ln\left|(x-1)(x+3)\right| + C$

1998

4. $\int \frac{1}{x^2-6x+8}\,dx =$

(A) $\frac{1}{2}\ln\left|\frac{x-4}{x-2}\right| + C$

(B) $\frac{1}{2}\ln\left|\frac{x-2}{x-4}\right| + C$

(C) $\frac{1}{2}\ln\left|(x-2)(x-4)\right| + C$

(D) $\frac{1}{2}\ln\left|(x-4)(x+2)\right| + C$

(E) $\ln\left|(x-2)(x-4)\right| + C$

15. $\int x\cos x\,dx =$

(A) $x\sin x - \cos x + C$

(B) $x\sin x + \cos x + C$

(C) $-x\sin x + \cos x + C$

(D) $x\sin x + C$

(E) $\frac{1}{2}x^2\sin x + C$

22. If $\lim_{b\to\infty}\int_1^b \frac{dx}{x^p}$ is finite, then which of the following must be true?

(A) $\sum_{n=1}^{\infty}\frac{1}{n^p}$ converges

(B) $\sum_{n=1}^{\infty}\frac{1}{n^p}$ diverges

(C) $\sum_{n=1}^{\infty}\frac{1}{n^{p-2}}$ converges

(D) $\sum_{n=1}^{\infty}\frac{1}{n^{p-1}}$ converges

(E) $\sum_{n=1}^{\infty}\frac{1}{n^{p+1}}$ diverges

26. The population $P(t)$ of a species satisfies the logistic differential equation $\frac{dP}{dt} = P\left(2 - \frac{P}{5000}\right)$, where the initial population $P(0) = 3{,}000$ and t is the time in years. What is $\lim_{t\to\infty} P(t)$?

(A) 2,500 (B) 3,000 (C) 4,200 (D) 5,000 (E) 10,000

28. $\lim_{x\to 1}\frac{\int_1^x e^{t^2}\,dt}{x^2-1}$ is

(A) 0 (B) 1 (C) $\frac{e}{2}$ (D) e (E) nonexistent

1969 BC

1. C
2. E
3. B
4. D
5. E
6. B
7. D
8. C
9. D
10. A
11. B
12. E
13. C
14. D
15. B
16. B
17. B
18. E
19. C
20. A
21. B
22. E
23. D
24. C
25. A
26. C
27. C
28. D
29. C
30. D
31. C
32. B
33. A
34. D
35. A
36. B
37. D
38. A
39. D
40. E
41. D
42. B
43. E
44. E
45. E

1973 BC

1. A
2. D
3. A
4. C
5. B
6. D
7. D
8. B
9. A
10. A
11. E
12. D
13. D
14. A
15. C
16. A
17. C
18. D
19. D
20. E
21. B
22. C
23. C
24. A
25. B
26. D
27. E
28. C
29. A
30. B
31. E
32. C
33. A
34. C
35. C
36. E
37. E
38. B
39. D
40. C
41. D
42. D
43. E
44. A
45. E

1985 BC

1. D
2. A
3. B
4. D
5. D
6. E
7. A
8. C
9. B
10. A
11. A
12. A
13. B
14. C
15. C
16. C
17. B
18. C
19. D
20. C
21. B
22. A
23. C
24. D
25. C
26. E
27. E
28. E
29. D
30. B
31. D
32. E
33. C
34. A
35. B
36. E
37. A
38. C
39. A
40. A
41. C
42. E
43. E
44. A
45. D

1988 BC

1. A
2. D
3. B
4. E
5. C
6. C
7. A
8. A
9. D
10. D
11. A
12. B
13. B
14. A
15. E
16. A
17. D
18. E
19. B
20. E
21. D
22. E
23. E
24. D
25. D
26. C
27. B
28. E
29. B
30. C
31. C
32. E
33. E
34. C
35. A
36. E or D
37. D
38. C
39. C
40. E
41. B
42. A
43. A
44. A
45. B

1993 BC

1. A
2. C
3. E
4. B
5. D
6. A
7. A
8. B
9. D
10. E
11. E
12. E
13. C
14. B
15. D
16. A
17. A
18. B
19. B
20. E
21. A
22. B
23. D
24. C
25. D
26. B
27. C
28. A
29. E
30. C
31. A
32. B
33. A
34. E
35. A
36. E
37. B
38. C
39. C
40. C
41. C
42. E
43. A
44. E
45. D

1997 BC

1. C
2. E
3. A
4. C
5. C
6. A
7. C
8. E
9. A
10. B
11. C
12. A
13. B
14. C
15. D
16. B
17. B
18. C
19. D
20. E
21. A
22. C
23. E
24. D
25. A
76. D
77. E
78. A
79. D
80. B
81. D
82. B
83. E
84. C
85. D
86. A
87. B
88. C
89. D
90. B

1998 BC

1. C
2. A
3. D
4. A
5. A
6. E
7. E
8. B
9. D
10. E
11. A
12. E
13. B
14. E
15. B
16. C
17. D
18. B
19. D
20. E
21. C
22. A
23. E
24. C
25. C
26. E
27. D
28. C
76. D
77. E
78. B
79. A
80. B
81. B
82. B
83. C
84. B
85. C
86. C
87. D
88. C
89. A
90. A
91. E
92. D