ANSWER KEY

FOR

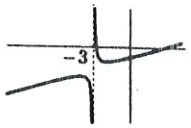
MULTIPLE-CHOICE & FREE-RESPONSE QUESTIONS IN PREPARATION FOR THE AP CALCULUS (BC) EXAMINATION

(SIXTH EDITION)

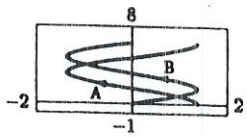
By David Lederman

SAMPLE EXAMINATION I

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

1a. 

b. $y \le -8$ or $y \ge -4$ c. 1 d. The graph of $f(x)$ looks like a line with a slope of one (as $x \to \pm\infty$)

2a. 

b. $A(-\sin t, 1)$ $B(\cos t, 1)$ c. A d. Both particles are moving upwards at the same rate.

3a. 172nd day b. 731 c. 267,546 minutes

4a. $x = 3$ b. $x = -3$ c. $-2 < x < 0$ and $2 < x \le 4$ d. 0

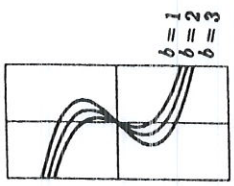
5a. $P(t) = \dfrac{30Ce^{0.9t}}{1 + Ce^{0.9t}}$ b. $P(t) = \dfrac{6e^{0.9t}}{1 + 0.2e^{0.9t}}$ c. 30,000

6a. when $x = -2$ and $x = 8$ b. $-3 \le x \le 3$ c. 6 d. $h(x) = -\frac{1}{2}x^2 + 3x + 6$

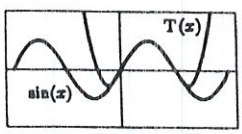
SAMPLE EXAMINATION II

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

1a. 8:30 am b. 10:30 am c. \$18.26 d. \$9.47

2a. 

b. $(-\sqrt{b}, 2b^{\frac{3}{2}})$ c. $(\sqrt{b}, -2b^{\frac{3}{2}})$ d. solve $\pm 2b^{\frac{3}{2}} = -a(\pm\sqrt{b})^3 \Rightarrow a = 2$

3a. 

b. $[0,3]$ c. $T_4(x) \ge \sin(x)$ d. $x = \frac{\pi}{2}$

4a. $\vec{v} = (2, -2t)$ b. $y = -t(x - 2t) + (36 - t^2)$ c. $x = \dfrac{t^2 + 36}{t}$ d. $t = 6$

5a. 45 ft/sec b. $t = 12$ c. 822 d. 1,170 feet

6a. $y = \ln\left|\dfrac{(x-3)^2(x+1)}{9}\right|$ b. $x = \dfrac{1}{3}$ c. There is an even vertical asymptote at $x = 3$ and $y \to -\infty$

SAMPLE EXAMINATION III

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

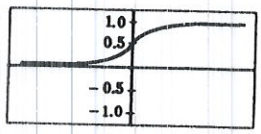
1a. $a(t) = -\frac{1}{t^2}\cos\left(\frac{1}{t}\right)$ b. $t = 0.127$ c.  d. left

2a. $g(x) = \frac{\sin k}{k}x$ b. $k = 4.493$ c. $\int_0^k \left(\sin x - \frac{\sin k}{k}x\right) dx$ d. 3.410

3a. $f'(x) = 0 + \frac{4}{3} + \frac{16}{9}x + \frac{48}{27}x^2 + \frac{128}{81}x^3 + \cdots + \frac{n2^{n+1}}{3^n}x^{n-1} + \cdots$ b. $f(0.2) \approx 2.302$; $f'(0.2) \approx 1.76$ c. $y = 1.76x + 1.95$

4a. $-\tan t$ b. The slope of the curved road and the two highways are the same at both A and B

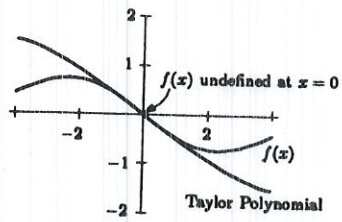
4c. $L = \int_0^{\frac{\pi}{2}} \sqrt{(-6\sin^2 t\cos t)^2 + (6\cos^2 t\sin t)^2}\, dt$

5a. $x = 10$ b. $x = -10$ c. $x = 0$ d. 

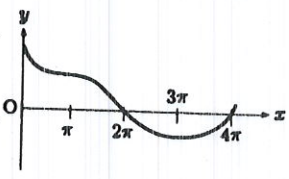
6a. $h(t) = \frac{1}{4}(8 - kt)^2$ b. $k = 0.125$ c. After 64 hours

SAMPLE EXAMINATION IV

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

1a. $-\frac{x}{2!} + \frac{x^3}{4!} - \frac{x^5}{6!} + \frac{x^7}{8!} - \cdots = \sum_{k=1}^{\infty}(-1)^k \frac{x^{2k-1}}{(2k)!}$ b. 

c. 0

2a. $x = \pi$ b. $x = 1$ and $x = 3\pi$ c. $2.0 < x < 6.6$ d. 

3a. $k = 1.6 \times 10^7$ b. $L(\theta) = 10^4\cos^2\theta$ c. The strength is decreasing at +1047.198 lumens/sec. d. $\theta = 1.249$

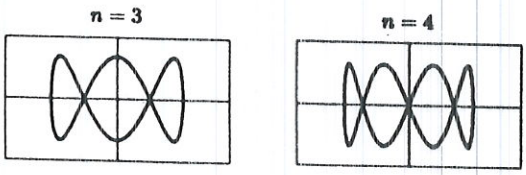
4a. $y - \frac{1}{2} = 16(x - 1)$ or $y = 16x - \frac{31}{2}$ b. $x = 2$ and $x = -7$ c. $\lim_{x\to 2} f'(x) = -0.049$; $\lim_{x\to -7} f'(x) = -\infty$

5a. $(\sqrt{3}, \sqrt{3})$ and $(-\sqrt{3}, -\sqrt{3})$ b. $V(x) = 9x - x^3$ c. $6\sqrt{3}$

6a. $y = Ce^x - 6$ b. $y = 6e^x - 6$ c. $y = -2e^x - 6$ d. $C > 0$

SAMPLE EXAMINATION V

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

1a. 

b. $\dfrac{n\cos(nt)}{-\sin t}$ c. $2n$ d. $t = 0, \pi$, and 2π

2a. rel max at $x = 3$; rel min at $x = 8$ b. 49.77; larger c. 26.94 d. smaller

3a. $f(x) = 1 - ax + \dfrac{a^2x^2}{2!} - \dfrac{a^3x^3}{3!} + \cdots + (-1)^n\dfrac{a^nx^n}{n!} + \cdots$ b. $f(x) = e^{-ax}$ c. five terms

4a. $15 < t < 45$ b. 0.207 ft/second/second c. 58.5 d. 58.5 feet

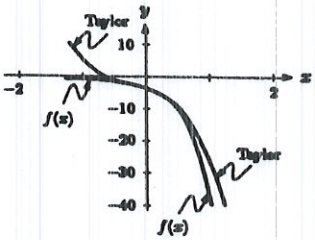
5a. $y = 35 + 5\cos\theta$ b. $\theta = \dfrac{\pi}{30}t$ c. $\dfrac{dy}{dt} = -\dfrac{\pi}{6}\sin\theta$ d. 45 minutes after the hour

6a. $T(t) = 1400 - k \cdot e^{-0.01t}$ b. $k = 1400$ c. safe

SAMPLE EXAMINATION VI

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

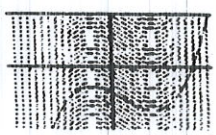
1a. $w = 1$ b. $0.60\,\text{cm}^2/\text{sec}$ c. when $w = \dfrac{4}{3}$

2a. $-2 - 6x - 9x^2 - 9x^3 - \cdots - \dfrac{2 \cdot 3^n x^n}{n!}$ b. $f(x) = -2e^{3x}$ c. 

3a. $R(t) = 10^6e^{-0.092t}$ b. $t \approx 125$ seconds c. 7.534 seconds

4a. $x(t) = 4\sin t$; $y(t) = -\cos t + 1$ b. $\dfrac{1}{4}$ c. $t = \dfrac{\pi}{4}$

5a. $x = 0$ and $8/5$ b. $f'(x) = x^{2/3}(x - 1)$ c. $y = -\dfrac{9}{40}$ d. $-\dfrac{9}{40}$

6a. $x = 2$ b. $x = -1$ c.  d. $x = 4$