Answers to AP Review 1

1. (a) $\frac{5}{2}, -6$

(b) 4

(c) $g'(x) = f(x)$ is positive on $(-2, 3)$ and negative on (3, 4) so g has its absolute minimum at an endpoint. Since $g(-2) = 6$ and $g(4) = \frac{5}{2}$, the absolute minimum value is -6.

(d) Only at $x = 1$. $g'(x) = f(x)$ changes from increasing to decreasing at $x = 1$. At $x = 2$, $g'(x) = f(x)$ does not change from increasing to decreasing or vice versa.

2. B   3. A   4. A   5. D

6. (a) $\frac{1}{2}$ 7. D   8. D

(b) $y - 4 = \frac{1}{2}(x - 1)$ 9. C   10. D

$f(1.2) \approx 4.1$ 11. B   12. C

(c) $y = \sqrt{x^3 + x + 14}$ 13. C

(d) 4.114

Answers to AP Review 2

14. (a) 5.680   (b) 0.461   (c) $1 + \int_0^{0.9419...} \sqrt{1 + \left(-2xe^{-x^2}\right)^2}\,dx + \int_0^{0.9419...} \sqrt{(1 + \sin x)^2}\,dx$

15. B   16. C   17. E   18. A

19. (a) Increasing since $v'(2) = a(2) = 15 > 0$

(b) At $t = 12$ sec. since $v(12) = v(0) + \int_0^{12} v'(t)\,dt = 55$ ft/sec

(c) v has its absolute maximum at either a critical point or at an endpoint. $v(0) = 55,\ v(6) = 115,\ v(16) = 10,\ v(18) = 25$. The largest value is 115 so the car's absolute maximum velocity is 115 ft/sec, and it occurs at $t = 6$ sec.

(d) The car's velocity is never equal to 0. The absolute minimum velocity is 10, which occurs at $t = 16$ (see work for part (c).)

20. E   21. C   22. A   23. B   24. D

Answers to AP Review 3

25. (b) 5.05   (c) $y = 5e^{\frac{x^2}{2}}$ so $f(0.2) = 5e^{0.02}$ (or 5.101)

16. C   27. E   28. D

29. (a) $y - 2 = -3(x - 0)$

(b) No, we don't know if f'' changes sign at $x = 0$.

(c) $y = 4$

(d) $g'(0) = 0$ and $g''(0) = -9$ so g has a local maximum at $x = 0$ by the Second Derivative Test.

30. A   31. D   32. E   33. C

Answers to AP Review 4

34. (a) 0.729 (b) 1.161 (c) 8.332

35. D 36. A 37. B 38. B 39. A

40. (a) $-\frac{1}{8}$ (b) $y=\frac{1}{x^2-6x+13}$

41. C 42. B 43. D 44. E 45. C

Answers to AP Review 5

46. (a) $\frac{125\pi}{12}cm^3$ (b) $-\frac{15\pi}{8}cm^3/hr$ (c) constant $= -\frac{3}{10}$

47. C 48. B 49. C 50. D 51. C

52. (a) 24

(b) $y+4=5(x-1)$, $f(1.2)\approx -3$. This approximation is less than the actual value because f is concave up on $1<x<1.2$

(c) By the Mean Value Theorem, there is a c with $0<c<0.5$ such that

$$f''(c)=\frac{f'(0.5)-f'(0)}{0.5-0}=\frac{3-0}{0.5}=6=r$$

(d) $g'(x)$ is not continuous at $x=0$, but $f'(x)$ is continuous at $x=0$ so f cannot equal g.

53. C 54. B 55. E

Answers to AP Review 6

56. (a) $a(2)=1.588$ and $v(2)=-2.728$. The speed is decreasing at $t=2$ because the velocity and the acceleration have opposite signs.

(b) $t=\sqrt{2\pi}$ (c) 4.334 (d) 2.265

57. E 58. D 59. D

60. (a) $1.5\,\text{gal}/\text{min}^2$

(b) $R''(45)=0$ since $R'(t)$ is a maximum and R' is differentiable.

(c) 3700 gallons. Yes, this approximation is less than the value of $\int_0^{90} R(t)\,dt$ because the graph of R is increasing on the interval.

(d) $\int_0^b R(t)\,dt$ is the total amount of fuel in gallons consumed for the first b minutes.

$\frac{1}{b}\int_0^b R(t)\,dt$ is the average value of the rate of fuel consumption in gallons per minute during the first b minutes.

61. A 62. D 63. E 64. C 65. A

Answers to AP Review 7

66. (a) f is continuous at $x=3$ because $\lim_{x\to 3^-} f(x)=\lim_{x\to 3^+} f(x)=2$. Therefore $\lim_{x\to 3} f(x)=2=f(3)$.

(b) $\frac{4}{3}$ (c) $m=\frac{2}{5}$, $k=\frac{8}{5}$

67. C 68. B 69. B 70. A

71. (b) 7.917 (c) 490.208

72. D 73. E 74. A 75. B