Answers of the even-numbered problems in Chapter 6
Section 6.1

38.
$$\frac{1}{3}x^3 + \frac{1}{x} + C$$

52.
$$x^3 - 3x^2 + 8$$

60.
$$f(t) = \frac{1}{3}t^3 - t^2 + 3t - \frac{1}{3}$$

section 6.2

28.
$$\frac{1}{2}\ln(e^{2x} + 1) + C$$

Section 6.4

8. $\frac{32}{3}$

10. $\frac{1}{4}$

Section 6.5

14.
$$\frac{20}{3}\sqrt{5} - \frac{4}{15}\sqrt{2}$$

22. $\frac{1}{4}\ln 3$

24. $\ln\left(\frac{1+e}{2}\right)$

26. $1 + \ln 2 + e^2 - e$

28. $\frac{1}{2}(\ln 2)^2$

34. 0

40. (1) Temperature will be dropped approximately 25.04 degree.
    (2) At 7pm, temperature is approximately 43 degree.

42. (Approximately) 343 thousand barrels.

Section 6.6

4. $\ln 4$

30. $\frac{2}{3}$

Answers of the even-numbered problems in Chapter 7
Section 7.1

8. $$\frac{1}{3}(x-3)e^{3x} - \frac{1}{9}e^{3x} + C$$

10. $$\frac{-x}{x+4} + \ln|x+4| + C$$

30. $2\ln 2 - \frac{3}{4}$

34. $$f(x) = \frac{2}{3}x(x+1)^{\frac{3}{2}} - \frac{4}{15}(x+1)^{\frac{5}{2}} - \frac{22}{15}$$

Section 7.2

14. $\frac{4}{45}$

Section 7.3

28. approximately 0.0067

Section 7.4

14. a. $3(b^{\frac{1}{3}} - 1)$ b. ∞

18. ∞(divergent)

20. ∞

22. $\frac{1}{3}$

28. $\frac{1}{3}$

34. divergent

46. 300 or $300,000$ dollar

Answers of the even-numbered problems in Chapter 8
section 8.2

6.
$$\frac{\partial f}{\partial x} = \frac{1}{y+1}, \qquad \frac{\partial f}{\partial y} = \frac{-x}{(1+y)^2}$$

26.
$$\frac{\partial g}{\partial x}(3,4) = \frac{3}{5}, \qquad \frac{\partial g}{\partial y}(3,4) = \frac{4}{5}$$

30.
$$\frac{\partial f}{\partial x}(0,e) = 1, \qquad \frac{\partial f}{\partial y}(0,e) = \frac{1}{e}$$

38.
$$\frac{\partial^2 f}{\partial x^2} = \frac{-y}{4\sqrt{x^3}}, \qquad \frac{\partial^2 f}{\partial y^2} = \frac{-x}{4\sqrt{y^3}}, \qquad \frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x} = \frac{1}{2\sqrt{y}} + \frac{1}{2\sqrt{x}}$$

section 8.3

8. There are no critical points of this function and so there is no relative extrema.

14. Critical Point $= (0, -1)$ $\Rightarrow$ Saddle point

20. Critical Point $= (2, \frac{-1}{2})$ $\Rightarrow$ Saddle point.

26. $(x, y, x) = (6, 6, 3)$

Section 8.4

4. $y = 0.53x + 1.91$

Section 8.5

6. f has the minimum value -1 at $(-\sqrt{2}, \frac{\sqrt{2}}{2})$ and $(\sqrt{2}, -\frac{\sqrt{2}}{2})$.

12. f has the maximum value e^4 at $(2,2), (-2,-2)$ and the minimum value e^{-4} at $(2,-2), (-2,2)$.

24. 1500 units on labor, 250 units on capital

Section 8.6

14.
$$df = \sqrt{y}dx + \left(\frac{x}{2\sqrt{y}} + \sqrt{z}\right)dy + \frac{y}{2\sqrt{z}}dz$$

28. $\Delta f \approx 0$

34. Output changes 65 units.

Answers of the even-numbered problems in Chapter 9
Section 9.1

6.
$$y = C_1e^x + C_2e^{2x}, \qquad y' = C_1e^x + 2C_2e^{2x}, \qquad y'' = C_1e^x + 4C_2e^{2x}$$
Substitute these into the given DEQ,
$$\begin{aligned} y'' - 3y' + 2y &= (C_1e^x + 4C_2e^{2x}) - 3(C_1e^x + 2C_2e^{2x}) + 2(C_1e^x + C_2e^{2x}) \\ &= (C_1 3C_1 + 2C_1)e^x + (4C_2 - 6C_2 + 2C_2)e^{2x} = 0 \end{aligned}$$

22.
$$\frac{dL}{L} = -kdx, \qquad L(x_0) = \frac{1}{2}L_0$$
(where k is a constant.)

Section 9.2

2.
$$\frac{1}{2}y^2 = \frac{1}{3}x^3 + C$$

Section 9.3

2. 12,500
4. approximately, 4.75 yesrs
6. a. $16,481.21$ dollar b. 6.9 years
10. approximately 69 words/min
16. approximately, 155

Answers of the even-numbered problems in Chapter 10 section 10.1

4. You need to check two conditions:

   (1) $f(x) = \frac{3}{8}x^2 \geq 0$ obvious

   (2)

$$\int_0^2 \frac{3}{8}x^2 dx = \frac{1}{8}x^3|_0^2 = \frac{1}{8} \cdot 8 = 1$$

   Hence this function is a probability density function.

14. $\frac{1}{8}$

26. *a*. 0.8647 *b*. 0.2387 *c*. 0 *d*. 0.3679

38. 0.2593

Answers of the even-numbered problems in Chapter 11
Section 11.1

4.

$$\begin{aligned} P_1(x) &= -1 + (x-2) \\ P_2(x) &= -1 + (x-2) - (x-2)^2 \\ P_3(x) &= -1 + (x-2) - (x-2)^2 + (x-2)^3 \end{aligned}$$

12. $P_3(x) = -1 + 5(x+1) - 10(x+1)^2 + 10(x+1)^3$

24. $\ln 1.1 \approx 0.095333$

Section 11.2

14. $a_n = \left(\frac{2}{3}\right)^{n-1}$

30. 0

34. 0

36. $\frac{1}{2}$

44. 0

Section 11.3

10. 6 (converge)

16. $\frac{e}{3(3-e)}$ (converge)

36. 30

38. 2377.083

Section 11.5

2. Radius of convergence= 2, interval of convergence is $(-2, 2)$

Section 11.6

4.

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

Interval of Convergence is $(-\frac{1}{2}, \frac{1}{2})$.

12.

$$xe^{\frac{x}{2}} = \sum_{n=0}^{\infty} \frac{x^{n+1}}{2^n n!}$$

Interval of Convergence is $(-\infty, \infty)$

22.

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

24.

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

26. (approximately) 0.0204

28. (approximately) 0.4483