1. If $f(x) = 2e^{3x} + \sin\, 2x + 3x$, then $\mathcal{L}[f(x)] =$

   (a) $\dfrac{2}{s-3} + \dfrac{2}{s^2+4} + \dfrac{3}{s^2}$

   (b) $\dfrac{2}{s-3} + \dfrac{s}{s^2+4} + \dfrac{3}{s^3}$

   (c) $\dfrac{2}{s+3} + \dfrac{2}{s^2+4} + \dfrac{3}{s}$

   (d) $\dfrac{2}{s+3} + \dfrac{s}{s^2+4} + \dfrac{3}{s^2}$

   (e) None of the above.

2. If $f(x) = 2e^{2x}\sin\, 3x - 2xe^{-3x} + 4x^2$, then $\mathcal{L}[f(x)] =$

   (a) $\dfrac{3}{s^2-4s+13} - \dfrac{2}{(s-3)^2} + \dfrac{2}{s^3}$

   (b) $\dfrac{s-3}{s^2-6s+13} + \dfrac{2}{(s+3)^2} + \dfrac{4}{s^2}$

   (c) $\dfrac{6}{s^2-4s+13} - \dfrac{2}{(s+3)^2} + \dfrac{8}{s^3}$

   (d) $\dfrac{s-2}{s^2-6s+13} + \dfrac{2}{(s+3)^2} + \dfrac{4}{s^2}$

   (e) None of the above.

3. If $f(x) = x^2 + 2x - 3e^x + 5\cos\, 3x$, then $\mathcal{L}[f(x)] =$

   (a) $\dfrac{1}{s^3} + \dfrac{2}{s^2} - \dfrac{3}{s-1} + \dfrac{5}{s^2+9}$

   (b) $\dfrac{2}{s^3} + \dfrac{1}{s^2} + \dfrac{3}{s+1} + \dfrac{5s}{s^2+9}$

   (c) $\dfrac{2}{s^3} + \dfrac{2}{s^2} - \dfrac{3}{s-1} + \dfrac{5s}{s^2+9}$

   (d) $\dfrac{1}{s^2} + \dfrac{2}{s} - \dfrac{3}{s+1} + \dfrac{15}{s^2+9}$

   (e) None of the above.

4. If $f(x) = 4\cosh x - 3x^2 + 3e^{-3x}$, then $\mathcal{L}[f(x)] =$

(a) $\dfrac{2}{s-1} - \dfrac{2}{s+1} - \dfrac{3}{s^3} + \dfrac{3}{s+3}$

(b) $\dfrac{2}{s-1} - \dfrac{2}{s+1} - \dfrac{6}{s^3} + \dfrac{3}{s+3}$

(c) $\dfrac{4}{s-1} - \dfrac{4}{s+1} - \dfrac{3}{s^3} + \dfrac{3}{s-3}$

(d) $\dfrac{2}{s-1} + \dfrac{2}{s+1} - \dfrac{6}{s^3} + \dfrac{3}{s+3}$

(e) None of the above.

5. If $F(s) = \dfrac{s^2 - 2s + 4}{(s-1)(s+2)^2}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $\frac{1}{3}e^x - 4xe^{2x} + \frac{2}{3}e^{2x}$

(b) $\frac{1}{3}e^x - 4xe^{-2x} + \frac{2}{3}e^{-2x}$

(c) $\frac{2}{3}e^x - 4xe^{-2x} + \frac{1}{3}e^{-2x}$

(d) $\frac{2}{3}e^x + 4xe^{-2x} + \frac{1}{3}e^{-2x}$

(e) None of the above.

6. If $F(s) = \dfrac{s^2 - 4}{s^3 - 3s^2 - s + 3}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $\frac{5}{8}e^{3x} + \frac{3}{4}e^x - \frac{3}{8}e^{-x}$

(b) $\frac{1}{8}e^{-3x} + \frac{3}{4}e^x - \frac{5}{8}e^{-x}$

(c) $\frac{3}{8}e^{3x} + \frac{1}{4}e^x - \frac{3}{8}e^{-x}$

(d) $\frac{5}{8}e^{-3x} + \frac{3}{4}e^{-x} - \frac{3}{8}e^x$

(e) None of the above.

7. If $F(s) = \dfrac{s + 4}{s^3 + 6s^2 + 9s}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $\frac{5}{9}x - \frac{4}{9}e^{3x} - \frac{1}{3}xe^{3x}$

(b) $\frac{4}{9} - \frac{4}{9}e^{-3x} - \frac{1}{3}xe^{-3x}$

(c) $\frac{4}{9} + \frac{4}{9}e^{-3x} + \frac{1}{3}xe^{-3x}$

(d) $\frac{4}{9}x^2 + \frac{4}{9}e^{3x} + \frac{1}{3}xe^{3x}$

(e) None of the above.

8. If $F(s) = \dfrac{s^3 + 3s^2}{s^4 + 5s^2 - 36}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $\frac{-5}{13}e^{2x} + \frac{1}{13}e^{-2x} + \frac{9}{13}\cos 3x - \frac{6}{13}\sin 3x$
(b) $\frac{5}{13}e^{2x} - \frac{1}{13}e^{-2x} + \frac{9}{13}\cos 3x + \frac{3}{13}\sin 3x$
(c) $\frac{-1}{13}e^{2x} + \frac{5}{13}e^{-2x} + \frac{9}{13}\cos 3x - \frac{6}{13}\sin 3x$
(d) $\frac{5}{13}e^{2x} - \frac{1}{13}e^{-2x} + \frac{9}{13}\cos 3x + \frac{9}{13}\sin 3x$
(e) None of the above.

9. If $F(s) = \dfrac{s^3 + 3s^2}{s^4 - 3s^2 - 4}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $-e^{2x} - \frac{1}{5}e^{-2x} + \frac{3}{5}\cos x + \frac{1}{5}\sin x$
(b) $e^{2x} + \frac{2}{5}e^{-2x} - \frac{1}{5}\cos x - \frac{3}{5}\sin x$
(c) $e^{2x} - \frac{1}{5}e^{-2x} + \frac{1}{5}\cos x + \frac{3}{5}\sin x$
(d) $e^{2x} + \frac{1}{5}e^{-2x} - \frac{1}{5}\cos x + \frac{3}{5}\sin x$
(e) None of the above.

10. If $F(s) = \dfrac{2s^2 + s + 3}{(s-1)^2(s+2)^2}$, then $\mathcal{L}^{-1}[F(s)]$ is:

(a) $\frac{2}{3}xe^{x} - \frac{1}{9}e^{x} - xe^{-2x} + \frac{1}{9}e^{-2x}$
(b) $\frac{2}{3}xe^{x} + \frac{1}{9}e^{x} + xe^{-2x} - \frac{1}{9}e^{-2x}$
(c) $\frac{1}{3}xe^{x} + \frac{2}{9}e^{x} + \frac{1}{2}xe^{-2x} - \frac{2}{3}e^{-2x}$
(d) $-\frac{1}{3}xe^{x} - \frac{1}{9}e^{x} + 2xe^{-2x} + \frac{1}{9}e^{-2x}$
(e) None of the above.

11. If $F(s) = \dfrac{3s^2 + 2s + 1}{(s^2+1)(s^2+2s+2)}$, then $\mathcal{L}^{-1}[F(s)] =$

(a) $\frac{6}{5}\cos x + \frac{2}{5}\sin x - \frac{6}{5}e^{-x}\cos x + \frac{7}{5}e^{-x}\sin x$
(b) $\frac{2}{5}\cos x + \frac{6}{5}\sin x - \frac{2}{5}e^{-x}\cos x + \frac{6}{5}e^{-x}\sin x$
(c) $\frac{3}{5}\cos x + \frac{2}{5}\sin x - \frac{6}{5}e^{-x}\cos x - \frac{7}{5}e^{-x}\sin x$
(d) $\frac{4}{5}\cos x + \frac{2}{5}\sin x + \frac{6}{5}e^{-x}\cos x - \frac{2}{5}e^{-x}\sin x$
(e) None of the above.

12. If $F(s)=\dfrac{s^2-2s+2}{s^3-7s^2+25s-39}$, then $\mathcal{L}^{-1}[F(s)]=$

(a) $-\frac{1}{2}e^{-3x}+\frac{1}{2}\,e^{2x}\cos 3x-\frac{5}{2}\,e^{2x}\sin 3x$
(b) $-\frac{1}{2}e^{-3x}+\frac{1}{2}\,e^{-2x}\cos 3x-\frac{1}{4}\,e^{-2x}\sin 3x$
(c) $\frac{1}{2}e^{3x}-\frac{1}{2}\,e^{2x}\cos 3x+\frac{1}{4}\,e^{2x}\sin 3x$
(d) $\frac{1}{2}e^{3x}+\frac{1}{2}\,e^{2x}\cos 3x+\frac{5}{6}\,e^{2x}\sin 3x$
(e) None of the above.

13. If $F(s)=\dfrac{3s^2+2s+1}{(s-1)^2(s^2+5s+6)}$, then $\mathcal{L}^{-1}[F(s)]$ is:

(a) $-\frac{1}{4}xe^{x}+\frac{3}{8}e^{x}+\frac{1}{2}e^{-2x}-\frac{9}{8}e^{-3x}$
(b) $\frac{1}{2}xe^{x}+\frac{5}{8}e^{x}-e^{-2x}+\frac{3}{4}e^{-3x}$
(c) $\frac{1}{2}xe^{x}+\frac{3}{8}e^{x}+e^{-2x}-\frac{11}{8}e^{-3x}$
(d) $\frac{1}{4}xe^{x}-\frac{3}{8}e^{x}-e^{-2x}+\frac{7}{8}e^{-3x}$
(e) None of the above.

14. Find the Laplace transform of the solution of

$$y'+2y=3\cos 2x,\ \ y(0)=-2.$$

(a) $Y(s)=\dfrac{3s}{(s^2+4)(s+2)}-\dfrac{2}{s+2}$
(b) $Y(s)=\dfrac{6s}{(s^2+4)(s+2)}-\dfrac{2}{s+2}$
(c) $Y(s)=\dfrac{3s}{(s^2+4)(s+2)}+\dfrac{2}{s+2}$
(d) $Y(s)=\dfrac{2s}{(s^2+4)(s+2)}+\dfrac{2}{s+2}$
(e) None of the above.

15. Find the Laplace transform of the solution of

$$y''-3y'-4y=4xe^{-3x},\ \ y(0)=-2,\ \ y'(0)=-3.$$

(a) $Y(s)=\dfrac{4}{(s+3)^2(s^2-3s-4)}+\dfrac{2s-6}{s^2-3s-4}$
(b) $Y(s)=\dfrac{4}{(s+3)^2(s^2-3s-4)}-\dfrac{2s-3}{s^2-3s-4}$
(c) $Y(s)=\dfrac{4}{(s+3)^2(s^2-3s-4)}+\dfrac{2s+3}{s^2-3s-4}$
(d) $Y(s)=\dfrac{4}{(s-3)^2(s^2-3s-4)}-\dfrac{2s-6}{s^2-3s-4}$
(e) None of the above.