Find the inverse Laplace transform of the following functions.

1. $F(s) = \dfrac{2s+3}{s^2-4s+20}$

2. $G(s) = \dfrac{1}{s(s+1)}$

3. $H(s) = \dfrac{2s}{(s^2+1)^2}$

4. $P(s) = \dfrac{1}{s(s+2)^2}$

5. $Q(s) = \dfrac{1}{(s-a)^n},\ n \in \mathbb{Z}^+$

6. $R(s) = \dfrac{3s^2}{(s^2+1)^2}$

7. $R(s) = \dfrac{2}{s^4}\left[\dfrac{1}{s} + \dfrac{3}{s^2} + \dfrac{4}{s^6}\right]$

8. $Q(s) = \dfrac{s-4}{(s^2+5)^2} + \dfrac{s}{s^2+2}$

9. $P(s) = \dfrac{1}{s^2-4s+5}$

10. $H(s) = \dfrac{s-3}{s^2+10s+9}$

11. $G(s) = \dfrac{s}{s^2-14s+1}$

12. $F(s) = \dfrac{e^{-4s}}{s(s^2+16)}$

13. $F(s) = \dfrac{e^{-s}}{(s-5)^3}$

14. $G(s) = \dfrac{se^{-10s}}{(s^2+4)^2}$

15. $H(s) = \dfrac{s^2-2s+3}{s(s^2-3s+2)}$

16. $P(s) = \dfrac{4s-5}{s^3-s^2-5s-3}$

17. $Q(s)\dfrac{-s}{(s-4)^2(s-5)}$

18. $R(s) = \dfrac{s^2+4s+1}{(s-2)^2(s+3)}$

19. $R(s) = \dfrac{s}{(s^2+a^2)(s^2-b^2)}$

20. $Q(s) = \dfrac{1}{(s+2)(s^2-9)}$

21. $P(s) = \dfrac{2}{s^3(s^2+5)}$

Solve the following IVP's.

22. $y' - 2y = e^{5t}, \quad y(0) = 3.$

23. $y'' - y = 1, \quad y(0) = 0, y'(0) = 1.$

24. $y'' - y' - 2y = 4t^2, \quad y(0) = 1, y'(0) = 4.$

25. $y'' + y = e^{-2t} \operatorname{sen} t, \quad y(0) = 0, y'(0) = 0.$

26. $y''' + 4y'' + 5y' + 2y = 10 \cos t, \quad y(0) = y'(0) = 0, y''(0) = 3.$

27. $y'' + 4y' + 8y = \operatorname{sen} t, \quad y(0) = 1, y'(0) = 0.$

28. $y' - 2y = 1 - t, \quad y(0) = 1.$

29. $y'' - 4y' + 4y = 1, \quad y(0) = 1, y'(0) = 4.$

30. $y'' + 9y = t, \quad y(0) = y'(0) = 0.$

31. $y'' - 10y' + 26y = 4, \quad y(0) = 3, y'(0) = 15.$

32. $y'' - 6y' + 8y = e^t, \quad y(0) = 3, y'(0) = 9.$

33. $y'' + 4y = e^{-t} \operatorname{sen} t, \quad y(0) = 1, y'(0) = 4.$

34. $y'' + 2y' - 3y = e^{-3t}, \quad y(0) = 0, y'(0) = 0.$