

$$11) n^2 + 8n = -15$$

$$\begin{array}{r} +15 \quad +15 \\ n^2 + 8n + 15 = 0 \\ (n+3)(n+5) = 0 \\ \begin{array}{l} \swarrow \searrow \\ n+3=0 \quad n+5=0 \\ \underline{-3 \quad -3} \quad \underline{-5 \quad -5} \\ n=-3 \quad n=-5 \end{array} \end{array}$$

$$\boxed{n = -3}$$

$$\boxed{n = -5}$$

$$12) 5r^2 - 44r + 120 = -30 + 11r$$

$$\begin{array}{r} -11r + 30 \quad +30 - 11r \\ 5r^2 - 55r + 190 = 0 \\ 5(r^2 - 11r + 30) = 0 \\ 5(r-5)(r-6) = 0 \\ \begin{array}{l} \swarrow \searrow \\ r-5=0 \quad r-6=0 \\ \underline{+5 \quad +5} \quad \underline{+6 \quad +6} \\ r=5 \quad r=6 \end{array} \end{array}$$

$$\boxed{r = 5}$$

$$\boxed{r = 6}$$

$$13) -4k^2 - 8k - 3 = -3 - 5k^2$$

$$\begin{array}{r} +5k^2 + 3 \quad +3 + 5k^2 \\ k^2 - 8k = 0 \\ k(k-8) = 0 \\ \begin{array}{l} \swarrow \searrow \\ k=0 \quad k-8=0 \\ \quad \quad \underline{+8 \quad +8} \\ \quad \quad k=8 \end{array} \end{array}$$

$$\boxed{k = 0}$$

$$\boxed{k = 8}$$

$$14) b^2 + 5b - 35 = 3b$$

$$\begin{array}{r} -3b \quad -3b \\ b^2 + 2b - 35 = 0 \\ (b-5)(b+7) = 0 \\ \begin{array}{l} \swarrow \searrow \\ b-5=0 \quad b+7=0 \\ \underline{+5 \quad +5} \quad \underline{-7 \quad -7} \\ b=5 \quad b=-7 \end{array} \end{array}$$

$$\boxed{b = -7}$$

$$\boxed{b = 5}$$

$$15) 3r^2 - 16r - 7 = 5$$

$$\begin{array}{r} -5 \quad -5 \\ 3r^2 - 16r - 12 = 0 \\ 3r^2 - 18r + 2r - 12 = 0 \\ 3r(r-6) + 2(r-6) = 0 \\ (3r+2)(r-6) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 3r+2=0 \quad r-6=0 \\ \underline{-2 \quad -2} \quad \underline{+6 \quad +6} \\ \frac{3r}{3} = \frac{-2}{3} \quad r=6 \\ r = -\frac{2}{3} \end{array} \end{array}$$

$$\boxed{r = -\frac{2}{3}}$$

$$\boxed{r = 6}$$

$$16) 6b^2 - 13b + 3 = -3$$

$$\begin{array}{r} +3 \quad +3 \\ 6b^2 - 13b + 6 = 0 \\ 6b^2 - 9b - 4b + 6 = 0 \\ 3b(2b-3) - 2(2b-3) = 0 \\ (3b-2)(2b-3) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 3b-2=0 \quad 2b-3=0 \\ \underline{+2 \quad +2} \quad \underline{+3 \quad +3} \\ 3b=2 \quad 2b=3 \\ b=\frac{2}{3} \quad b=\frac{3}{2} \end{array} \end{array}$$

$$\boxed{b = \frac{2}{3}}$$

$$\boxed{b = \frac{3}{2}}$$

$$17) 7k^2 - 6k + 3 = 3$$

$$\begin{array}{r} -3 \quad -3 \\ 7k^2 - 6k = 0 \\ k(7k-6) = 0 \\ \begin{array}{l} \swarrow \searrow \\ k=0 \quad 7k-6=0 \\ \quad \quad \underline{+6 \quad +6} \\ \quad \quad 7k=6 \\ \quad \quad \frac{7k}{7} = \frac{6}{7} \\ \quad \quad k = \frac{6}{7} \end{array} \end{array}$$

$$\boxed{k = 0}$$

$$\boxed{k = \frac{6}{7}}$$

$$18) 35k^2 - 22k + 7 = 4$$

$$\begin{array}{r} -4 \quad -4 \\ 35k^2 - 22k + 3 = 0 \\ 35k^2 - 15k - 7k + 3 = 0 \\ 5k(7k-3) - 1(7k-3) = 0 \\ (5k-1)(7k-3) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 5k-1=0 \quad 7k-3=0 \\ \underline{+1 \quad +1} \quad \underline{+3 \quad +3} \\ 5k=1 \quad 7k=3 \\ k=\frac{1}{5} \quad k=\frac{3}{7} \end{array} \end{array}$$

$$\boxed{k = \frac{3}{7}}$$

$$\boxed{k = \frac{1}{5}}$$

$$19) 7x^2 + 2x = 0$$

$$\begin{array}{r} x(7x+2) = 0 \\ \begin{array}{l} \swarrow \searrow \\ x=0 \quad 7x+2=0 \\ \quad \quad \underline{-2 \quad -2} \\ \quad \quad 7x = -2 \\ \quad \quad \frac{7x}{7} = \frac{-2}{7} \\ \quad \quad x = -\frac{2}{7} \end{array} \end{array}$$

$$\boxed{x = -\frac{2}{7}}$$

$$\boxed{x = 0}$$

$$20) 10b^2 = 27b - 18$$

$$\begin{array}{r} -27b + 18 \quad -27b + 18 \\ 10b^2 - 27b + 18 = 0 \\ 10b^2 - 12b - 15b + 18 = 0 \\ 2b(5b-6) - 3(5b-6) = 0 \\ (2b-3)(5b-6) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 2b-3=0 \quad 5b-6=0 \\ \underline{+3 \quad +3} \quad \underline{+6 \quad +6} \\ 2b=3 \quad 5b=6 \\ b=\frac{3}{2} \quad b=\frac{6}{5} \end{array} \end{array}$$

$$\boxed{b = \frac{3}{2}}$$

$$\boxed{b = \frac{6}{5}}$$

$$21) 8x^2 + 21 = -59x$$

$$\begin{array}{r} +59x \quad +59x \\ 8x^2 + 59x + 21 = 0 \\ 8x^2 + 56x + 3x + 21 = 0 \\ 8x(x+7) + 3(x+7) = 0 \\ (8x+3)(x+7) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 8x+3=0 \quad x+7=0 \\ \underline{-3 \quad -3} \quad \underline{-7 \quad -7} \\ 8x=-3 \quad x=-7 \\ x=-\frac{3}{8} \end{array} \end{array}$$

$$\boxed{x = -\frac{3}{8}}$$

$$\boxed{x = -7}$$

$$22) 15a^2 - 3a = 3 - 7a$$

$$\begin{array}{r} -3+7a \quad -3+7a \\ 15a^2 + 4a - 3 = 0 \\ 15a^2 + 9a - 5a - 3 = 0 \\ 3a(5a+3) - 1(5a+3) = 0 \\ (3a-1)(5a+3) = 0 \\ \begin{array}{l} \swarrow \searrow \\ 3a-1=0 \quad 5a+3=0 \\ \underline{+1 \quad +1} \quad \underline{-3 \quad -3} \\ 3a=1 \quad 5a=-3 \\ a=\frac{1}{3} \quad a=-\frac{3}{5} \end{array} \end{array}$$

$$\boxed{a = -\frac{3}{5}}$$

$$\boxed{a = \frac{1}{3}}$$