p. 526 2–12 even, 31–34 graphs, 53, 57–58

$\boxed{7.1}$

#2 $y = x^2 - 6x + 5$
$y = 2x - 7$

a) $(2,-3)$ $\quad -3 = (2)^2 - 6(2) + 5 = -3$
$-3 = 2(2) - 7 = -3$ $\quad \boxed{\text{yes!}}$

b) $(1,-5)$ $\quad -5 \neq (1)^2 - 6(1) + 5 = 0$ $\quad \boxed{\text{No!}}$

c) $(6,5)$ $\quad 5 = (6)^2 - 6(6) + 5 = 5$
$5 = 2(6) - 7 = 5$ $\quad \boxed{\text{yes!}}$

#4 $x = 3$
$x - y = 20$

$3 - y = 20$
$-3 \qquad -3$
$-y = 17$
$y = -17$

$\boxed{(3,-17)}$

#6 $2x - 3y = -23$
$x + y = 0$
$-x \qquad -x$
$y = -x$

$2x - 3(-x) = -23$
$2x + 3x = -23$
$\frac{5x}{5} = \frac{-23}{5}$
$x = \frac{-23}{5} \quad y = \frac{23}{5}$

$\boxed{\left(\frac{-23}{5}, \frac{23}{5}\right)}$

#8 $3x + 2y = -5$
$2x - 5y = -16$
$+5y \qquad +5y$
$\frac{2x}{2} = \frac{-16 + 5y}{2}$
$x = -8 + \frac{5}{2}y$

$3\left(-8 + \frac{5}{2}y\right) + 2y = -5$
$\left(-24 + \frac{15}{2}y + 2y = -5\right)2$
$-48 + 15y + 4y = -10$
$-48 + 19y = -10$
$+48 \qquad +48$
$\frac{19y}{19} = \frac{38}{19}$
$y = 2$

$x = -8 + \frac{5}{2}(2)$
$x = -8 + 5 = -3$

$\boxed{(-3,2)}$

#10 $3x - y = -2$
$-9x + 3y = 6$
$3x + 2 = y$

$-9x + 3(3x + 2) = 6$
$\cancel{-9x} + \cancel{9x} + 6 = 6$
$6 = 6$
Always!

$\boxed{\text{Infinitely many solutions!}}$

#12 $x = y + 3$
$x - y^2 = 3y$

$(y+3) - y^2 = 3y$
$y + 3 - y^2 = 3y$
$-y - 3 + y^2 \quad -y - 3 + y^2$

$y^2 + 2y - 3 = 0$
$(y+3)(y-1) = 0$
$y = -3 \quad y = 1$

$x = -3 + 3 \quad x = 1 + 3$
$x = 0 \quad x = 4$

$\boxed{(0,-3)\ (4,1)}$

#31

$3x + 5y = 7$
$4x - 2y = -3$

$\frac{5y}{5} = \frac{7-3x}{5}$ $\quad$ $\frac{-2y}{-2} = \frac{-3-4x}{-2}$

$y_1 = \frac{7-3x}{5}$ $\quad$ $y_2 = \frac{-3-4x}{-2}$

Different slopes means

$\boxed{\text{ONE SOLUTION!}}$

#32

$3x - 9y = 6$
$2x - 6y = 1$

$\frac{-9y}{-9} = \frac{6-3x}{-9}$ $\quad$ $\frac{-6y}{-6} = \frac{1-2x}{-6}$

$y = \frac{6-3x}{-9}$ $\quad$ $y = \frac{1-2x}{-6}$

same slope, different y-int means

$\boxed{\text{No SOLUTION!}}$

#33

$2x - 4y = 6$
$3x - 6y = 9$

$\frac{-4y}{-4} = \frac{6-2x}{-4}$ $\quad$ $\frac{-6y}{-6} = \frac{9-3x}{-6}$

$y = \frac{6-2x}{-4}$ $\quad$ $y = \frac{9-3x}{-6}$

same slope, same y-int

$\boxed{\text{Infinitely many Solutions}}$

#34

$x - 7y = 9$
$3x + 4y = 1$

$\frac{-7y}{-7} = \frac{9-x}{-7}$ $\quad$ $\frac{4y}{4} = \frac{1-3x}{4}$

$y = \frac{9-x}{-7}$ $\quad$ $y = \frac{1-3x}{4}$

Different slopes means

$\boxed{\text{ONE SOLUTION!}}$

#53

m = cost of medium soda
L = cost of large soda

$M + L = 1.74$
$L = m + 0.16$

$m + (m + 0.16) = 1.74$

$2m + 0.16 = 1.74$
$-0.16 \quad -0.16$

$\frac{2m}{2} = \frac{1.58}{2}$

$m = 0.79 \quad L = 0.95$

$\boxed{\text{A medium costs \$0.79 and a large costs \$0.95.}}$

#57

$Cost_{\text{[redacted]}} = 40 + 0.10m$
$Cost_{\text{[redacted]}} = 25 + 0.15m$

a) $40 + 0.10m = 25 + 0.15m$
$-25 \quad -0.10m \quad -25 \quad -0.10m$

$\frac{15}{0.05} = \frac{0.05m}{0.05}$

$m = \boxed{300 \text{ miles to have equal cost}}$

b) One plan will be cheaper with less than 300 miles the other cheaper after 300 miles.

#58

$Pay = 300 + 0.05s$
$Pay = 600 + 0.01s$

a) $300 + 0.05s = 600 + 0.01s$
$-300 \quad -0.01s \quad -300 \quad -0.01s$

$\frac{0.04s}{0.04} = \frac{300}{0.04}$

$s = \boxed{\$7{,}500 \text{ in sales for Stephanie}}$

p. 526 13-18, 20-26 even, 27-30, 37-39

$\boxed{7.1}$

#13

$y = 6x^2$

$7x + y = 3$

$7x + 6x^2 = 3$

$6x^2 + 7x - 3 = 0$

$(3x - 1)(2x + 3) = 0$

$x = \frac{1}{3} \quad x = \frac{-3}{2}$

$y = 6\left(\frac{1}{3}\right)^2 \quad y = 6\left(\frac{-3}{2}\right)^2$

$y = \frac{6}{9} \quad y = 6\left(\frac{9}{4}\right)$

$\boxed{\left(\frac{1}{3}, \frac{2}{3}\right)}$ $\boxed{\left(\frac{-3}{2}, \frac{27}{2}\right)}$

#14

$y = 2x^2 + x$

$2x + y = 20$

$2x + 2x^2 + x = 20$

$2x^2 + 3x - 20 = 0$

$(2x - 5)(x + 4) = 0$

$x = \frac{5}{2} \quad x = -4$

$y = 2\left(\frac{5}{2}\right)^2 + \left(\frac{5}{2}\right)$

$y = 2\left(\frac{25}{4}\right) + \frac{5}{2}$

$y = \frac{50}{4} + \frac{10}{4} = \frac{60}{4} = 15$

$\boxed{\left(\frac{5}{2}, 15\right)}$

$y = 2(-4)^2 + (-4)$

$y = 2(16) + (-4) = 28$

$\boxed{(-4, 28)}$

#15

$y = x^3 - x^2$

$y = 2x^2$

$2x^2 = x^3 - x^2$

$-2x^2 \quad -2x^2$

$0 = x^3 - 3x^2$

$0 = x^2(x - 3)$

$x = 0 \quad x = 3$

$y = 2(0)^2 = 0$ $\boxed{(0, 0)}$

$y = 2(3)^2 = 18$ $\boxed{(3, 18)}$

#16

$y = x^3 + x^2$

$y = -x^2$

$-x^2 = x^3 + x^2$

$+x^2 \quad +x^2$

$0 = x^3 + 2x^2$

$0 = x^2(x + 2)$

$x = 0 \quad x = -2$

$\boxed{(0, 0)}$

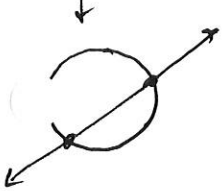
$\boxed{(-2, -4)}$

#17

$x^2 + y^2 = 9$

$x - 3y = -1$

$x = -1 + 3y$



$(-1 + 3y)^2 + y^2 = 9$

$1 - 6y + 9y^2 + y^2 = 9$

$10y^2 - 6y - 8 = 0$

$2(5y^2 - 3y - 4) = 0$

$\cancel{2(5y - 4)(y + 1)}$

$x = \frac{3 \pm \sqrt{9 - 4(5)(-4)}}{10}$

$x = \frac{3 \pm \sqrt{89}}{10}$

oh goodness, yep
2 x values plugged in
will give 2 y values.
Have fun.

#18

$x^2+y^2=16$

$4x+7y=13$

$\frac{7y}{7}=\frac{13-4x}{7}$

$y=\frac{13-4x}{7}$

$x^2+\left(\frac{13-4x}{7}\right)^2=16$

$\left(x^2+\frac{169-104x+16x^2}{49}=16\right)49$

$49x^2+169-104x+16x^2=784$

$65x^2-104x-615=0$

$x=\frac{104\pm\sqrt{10816-4(65)(-615)}}{130}$

$x=\frac{104\pm\sqrt{170716}}{130}$

$x=\frac{104\pm\sqrt{196}\sqrt{871}}{130}$

$x=\frac{104\pm14\sqrt{871}}{130}$

$x=\frac{52\pm7\sqrt{871}}{65}$

So theres your 2 x values, plug them into the linear to find your y values, Have fun.

#20

$(2x+y=10)2$

$x-2y=-5$

$4x+2y=20$

$5x=15$

$x=3$ $\boxed{(3,4)}$

$3-2y=-5$

$-3 \quad -3$

$-2y=-8$

$y=4$

#22

$(4x-5y=-23)(4)$

$(3x+4y=6)(5)$

$16x-20y=-92$

$15x+20y=30$

$\frac{31x}{31}=\frac{-62}{31}$

$x=-2$ $\boxed{(-2,3)}$

$3(-2)+4y=6$

$-6+4y=6$

$4y=12$

$y=3$

#24

$2x-4y=8$

$(-x+2y=-4)2$

$-2x+4y=-8$

$0=0$

$\boxed{\text{Infinitely Many Solutions}}$

#26

$(2x-y=3)2$

$-4x+2y=5$

$4x-2y=6$

$0=11$

$\boxed{\text{No Solution}}$

#27 $(0,1)$ $(3,-2)$

#28 $(1.5,1)$

don't forget to do the algebra!

#29 No Solution

use substitution like the directions say!

#30 $(0,-4)$ $(2.65,3)$ $(-2.65,3)$

#37 $(-2.32,-3.16)$ $(0.47,-1.77)$ $(1.85,-1.08)$

use substitution!

#38 $(-0.70,-2.40)$ $(5.70,10.40)$

#39 $(-1.2,1.6)$ $(2,0)$

p. 552 1-7 odd, 35-43 odd, 65, 73

$\boxed{7.3}$

$x - 3y + z = 0$

$2y + 3z = 1$

$z = -2$

$2y + 3(-2) = 1$

$2y - 6 = 1$

$+6 \quad +6$

$\frac{2y}{2} = \frac{7}{2}$

$y = \frac{7}{2}$

$x - 3\left(\frac{7}{2}\right) + (-2) = 0$

$x - \frac{21}{2} - \frac{4}{2} = 0$

$x - \frac{25}{2} = 0$

$x = \frac{25}{2}$

$\boxed{\left(\frac{25}{2}, \frac{7}{2}, -2\right)}$

#3

$x - y + z = 0$

$2x - 3z = -1$

$-x - y + 2z = -1$

$-x + y - z = 0$

$-x - y + 2z = -1$

$-2x + z = -1$

$2x - 3z = -1$

$-2z = -2$

$z = \frac{2}{2} = 1$

$2x - 3(1) = -1$

$2x - 3 = -1$

$2x = 2$

$x = 1$

$1 - y + 1 = 0$

$y = 2$

$\boxed{(1, 2, 1)}$

#5

$x + y + z = -3$

$4x - y = -5$

$-3x + 2y + z = 4$

$-x - y - z = 3$

$-3x + 2y + z = 4$

$-4x + y = 7$

$4x - y = -5$

$0 = 2$

$\boxed{\text{No Solution}}$

#7

$x+y-z=4$

$(y+w=-4)(-1)$

$x-y=1$

$x+z+w=1$

$x+y-z=4$

$x \quad +z+w=1$

$2x+y+w=5$

$-y-w=4$

$2x=9$

$x=\frac{9}{2}$

$\frac{9}{2}-y=1$

$-\frac{9}{2} \qquad -\frac{9}{2}$

$-y=-\frac{7}{2}$

$y=\frac{7}{2}$

$\frac{9}{2}+\frac{7}{2}-z=4$

$\frac{16}{2}-z=4$

$-8 \qquad -8$

$-z=-4$

$z=4$

$\frac{7}{2}+w=-4$

$w=\frac{-15}{2}$

$\boxed{\left(\frac{-15}{2}, \frac{9}{2}, \frac{7}{2}, 4\right)}$

#35

$(x+2y-z=3)3$

$3x+7y-3z=12$

$-2x-4y+3z=-5$

$3x+6y-3z=9$

$-2x-4y+3z=-5$

$x+3y=7$

$-x-2y=-4$

$y=3$

$(x+2y=4)(-1)$

$x+3(3)=7$

$x+9=7$

$x=-2$

$-2+2(3)-z=3$

$-2+6-z=3$

$-z=-1$

$z=1$

$\boxed{(-2,3,1)}$

#37

$(x+y+3z=2)(-3)$

$3x+4y+10z=5$

$(x+2y+4z=3)(-3)$

$3x+4y+10z=5$

$-3x-3y-9z=-6$

$(y+z=-1)(2)$

$-3x-6y-12z=-9$

$3x+4y+10z=5$

$-2y-2z=-4$

$2y+2z=-2$

$0=-6$

$\boxed{\text{No Solution}}$

#39

$x + z = 2$ | $x = 2 - z$

$2x + y + z = 5$

$2(2-z) + y + z = 5$

$4 - 2z + y + z = 5$

$-4 \qquad -4$

$-z + y = 1$

$+z \qquad +z$

$y = 1 + z$

$\boxed{(2-z,\ 1+z,\ z)}$

#41

$(x + 2y = 4)(-3) \rightarrow -3x - 6y = -12$

$3x + 4y = 5 \rightarrow 3x + 4y = 5$

$2x + 3y = 4$

$-2y = 7$

$y = -\frac{7}{2}$

$x + 2\left(-\frac{7}{2}\right) = 4$

$x - 7 = 4$

$x = 11$

$\left(11, -\frac{7}{2}\right)$? Nope, its a solution to the first 2 equations but not all 3.

$2(11) + 3\left(-\frac{7}{2}\right) \stackrel{?}{=} 4$

$22 - \frac{21}{2} \stackrel{?}{=} 4$

$\frac{44}{2} - \frac{21}{2} \stackrel{?}{=} 4$

$\frac{23}{2} \stackrel{?}{=} 4$

$\boxed{\text{No Solution}}$

#43

$x + y - 3z = 1$

$x - z - w = 2$

$2x + y - 4z - w = 3$

$\boxed{(z + w + 2,\ 2z - w - 1,\ z,\ w)}$

#65 $\boxed{\text{No Solution}}$

#73

C = # of children

A = # of adults

S = # of Seniors

$C + A + S = 1400 \rightarrow C + A + S = 1400$

$.25c + 1A + .75s = 740$

$C = (A + S) + 250 \rightarrow C - A - S = 250$

$C - A - S = 250$

$\frac{2C}{2} = \frac{1650}{2}$

$c = 825$

$825 + A + 165 = 1400$

$A = 410$

$.25c + A + .75S = 740$

$206.25 + A + .75S = 740$

$825 - A - S = 250$

$1031.25 - .25S = 990$

$-.25S = -41.25$

$S = 165$

$\boxed{\text{825 children, 410 adults, 165 seniors went for a train ride}}$

pg. 562 1–4 5–10

$\boxed{7.4}$

(day 1 and 2)

#1 $$\frac{x^2-7}{x(x^2-4)} = \frac{A}{x} + \frac{B}{x+2} + \frac{C}{x-2}$$

$x(x+2)(x-2)$

#2 $$\frac{x^4+3x^2-1}{(x^2+x+1)^2(x^2-x+1)} = \frac{Ax+B}{(x^2+x+1)} + \frac{Cx+D}{(x^2+x+1)^2} + \frac{Ex+F}{(x^2-x+1)}$$

#3 $$\frac{x^5-2x^4+x-1}{x^3(x-1)^2(x^2+9)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{(x-1)} + \frac{E}{(x-1)^2} + \frac{Fx+G}{(x^2+9)}$$

#4 $$\frac{x^2+3x+2}{(x^3-1)^3} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{(x-1)^3} + \frac{Dx+E}{(x^2+x+1)} + \frac{Fx+G}{(x^2+x+1)^2} + \frac{Hx+I}{(x^2+x+1)^3}$$

$(x-1)^3(x^2+x+1)^3$

#5 $$\frac{x+22}{(x+4)(x-2)} = \frac{A}{x+4} + \frac{B}{x-2} \quad (x+4)(x-2)$$

$$x+22 = A(x-2) + B(x+4)$$
$$= Ax - 2A + Bx + 4B$$
$$= Ax + Bx + (-2A + 4B)$$
$$x+22 = (A+B)x + (-2A+4B)$$

$$\boxed{\frac{-3}{x+4} + \frac{4}{x-2}}$$

$2(A+B=1)$

$$-2A + 4B = 22$$
$$2A + 2B = 2$$
$$6B = 24$$
$$B = 4 \quad A = -3$$

#6 $\left[\dfrac{x-3}{x(x+3)} = \dfrac{A}{x+3} + \dfrac{B}{x}\right] x(x+3)$

$x-3 = Ax + B(x+3)$

$= Ax + Bx + 3B$

$x-3 = (A+B)x + 3B$

$A+B=1 \qquad 3B=-3$

$A=2 \qquad B=-1$

$$\boxed{\frac{2}{x+3} + \frac{-1}{x}}$$

#7 $\left[\dfrac{3x^2+2x+2}{(x^2+1)^2} = \dfrac{Ax+B}{x^2+1} + \dfrac{Cx+D}{(x^2+1)^2}\right] (x^2+1)^2$

$3x^2+2x+2 = (Ax+B)(x^2+1) + Cx+D$

$= \cancel{Ax^3} + \cancel{Ax} + \cancel{Bx^2} + B + \cancel{Cx} + D$

$= Ax^3 + Bx^2 + Ax + Cx + B + D$

$= (A+C)x$

$A=0 \quad B=3 \quad A+C=2 \quad B+D=2$

$C=2 \quad D=-1$

$$\boxed{\frac{3}{x^2+1} + \frac{2x-1}{(x^2+1)^2}}$$

#8 $\left[\dfrac{4x+4}{x^2(x+2)} = \dfrac{A}{x} + \dfrac{B}{x^2} + \dfrac{C}{x+2}\right] x^2(x+2)$

$4x+4 = Ax(x+2) + B(x+2) + Cx^2$

$= \cancel{Ax^2} + \cancel{2Ax} + \cancel{Bx} + 2B + \cancel{Cx^2}$

$= Ax^2 + Cx^2 + 2Ax + Bx + 2B$

$0x^2 + 4x + 4 = (A+C)x^2 + (2A+B)x + 2B$

$A+C=0 \qquad 2A+B=4 \qquad 2B=4$

$C=-1 \qquad A=1 \qquad B=2$

$$\boxed{\frac{1}{x} + \frac{2}{x^2} + \frac{-1}{x+2}}$$

#9 $\left[\dfrac{x^2-2x+1}{(x-2)^3} = \dfrac{A}{x-2} + \dfrac{B}{(x-2)^2} + \dfrac{C}{(x-2)^3}\right] (x-2)^3$

$$\boxed{\frac{1}{x-2} + \frac{2}{(x-2)^2} + \frac{1}{(x-2)^3}}$$

$x^2-2x+1 = A(x-2)^2 + B(x-2) + C$

$= A(x^2-4x+4) + Bx - 2B + C$

$= \cancel{Ax^2} - \cancel{4Ax} + 4A + \cancel{Bx} - 2B + C$

$= Ax^2 + -4Ax + Bx + 4A - 2B + C$

$= Ax^2 + (-4A+B)x + 4A - 2B + C$

$A=1 \quad -4A+B=-2 \quad 4A-2B+C=1$

$B=2 \quad C=1$

#10 $\dfrac{5x^3-10x^2+5x-5}{\cancel{(x^2+4)(x^2+9)}} = \dfrac{Ax+B}{\cancel{x^2+4}} + \dfrac{Cx+D}{\cancel{x^2+9}}$ $(x^2+4)(x^2+9)$

$$\boxed{\frac{-3x+7}{x^2+4} + \frac{8x-17}{x^2+9}}$$

$$5x^3-10x^2+5x-5 = (Ax+B)(x^2+9) + (Cx+D)(x^2+4)$$

$$= \cancel{Ax^3} + \cancel{9Ax} + \cancel{Bx^2} + 9B + \cancel{Cx^3} + \cancel{4Cx} + \cancel{Dx^2} + 4D$$

$$= Ax^3 + Cx^3 + Bx^2 + Dx^2 + 9Ax + 4Cx + 9B + 4D$$

$$5x^3 - 10x^2 + 5x - 5 = (A+C)x^3 + (B+D)x^2 + (9A+4C)x + (9B+4D)$$

$5 = A + C$ $\quad$ $(-4)(B+D = -10)$

$(-4)(A+C=5)$

$C = 8$ $\quad$ $D = -17$

$9A + 4C = 5$
$-4A - 4C = -20$
$5A = -15$
$A = -3$

$9B + 4D = -5$
$-4B - 4D = 40$
$5B = 35$
$B = 7$

p. 563 14-32 even but #25 instead of #26

$\boxed{7.4}$
(day 3)

#14 $\left[\dfrac{4}{(x+3)(x+7)} = \dfrac{A}{x+3} + \dfrac{B}{x+7}\right](x+3)(x+7)$

$$4 = A(x+7) + B(x+3)$$
$$4 = Ax + 7A + Bx + 3B$$
$$4 = Ax + Bx + 7A + 3B$$
$$4 = x(A+B) + (7A+3B)$$

$$\boxed{= \frac{1}{x+3} + \frac{-1}{x+7}}$$

$-7\,(A+B=0)$
$$7A + 3B = 4$$
$$-7A - 7B = 0$$
$$-4B = 4$$
$$B = -1$$
$$A = 1$$

#16 $\left[\dfrac{6}{x^2-9} = \dfrac{A}{x+3} + \dfrac{B}{x-3}\right](x+3)(x-3)$

$$6 = A(x-3) + B(x+3)$$
$$= Ax - 3A + Bx + 3B$$
$$= Ax + Bx - 3A + 3B$$
$$6 = x(A+B) + (-3A+3B)$$

$$\boxed{= \frac{-1}{x+3} + \frac{1}{x-3}}$$

$(A+B=0)(3)$
$$-3A + 3B = 6$$
$$3A + 3B = 0$$
$$6B = 6$$
$$B = 1$$
$$A = -1$$

#18 $\left[\dfrac{-6}{x^2-3x} = \dfrac{A}{x} + \dfrac{B}{x-3}\right]x(x-3)$

$x(x-3)$

$$\boxed{= \frac{2}{x} + \frac{-2}{x-3}}$$

$$-6 = A(x-3) + Bx$$
$$= Ax - 3A + Bx$$
$$= Ax + Bx - 3A$$
$$-6 = x(A+B) - 3A$$

$A+B=0$ $\quad \dfrac{-3A}{-3} = \dfrac{-6}{-3}$ $\quad A = 2 \quad B = -2$

#20 $\left[\dfrac{7x-7}{x^2-3x-10} = \dfrac{A}{x-5} + \dfrac{B}{x+2}\right](x-5)(x+2)$

$(x-5)(x+2)$

$$7x-7 = A(x+2) + B(x-5)$$
$$= Ax + 2A + Bx - B5$$
$$= Ax + Bx + 2A - 5B$$
$$7x-7 = (A+B)x + (2A-5B)$$

$(-2)(A+B=7)$

$$2A - 5B = -7$$
$$-2A - 2B = -14$$
$$\frac{-7B}{-7} = \frac{-21}{-7}$$
$$B = 3 \qquad A = 4$$

$$= \boxed{\frac{4}{x-5} + \frac{3}{x+2}}$$

#22 $\left[\dfrac{4x-11}{2x^2-x-3} = \dfrac{A}{2x-3} + \dfrac{B}{x+1}\right](2x-3)(x+1)$

$(2x-3)(x+1)$

$$4x-11 = A(x+1) + B(2x-3)$$
$$= Ax + A + 2Bx - 3B$$
$$= Ax + 2Bx + A - 3B$$
$$= (A+2B)x + (A-3B)$$

$(A+2B=4)(-1)$

$$A - 3B = -11$$
$$-A - 2B = -4$$
$$-5B = -15$$
$$B = 3$$

$$A + 2(3) = 4$$
$$A + 6 = 4$$
$$A = -2$$

$$= \boxed{\frac{-2}{2x-3} + \frac{3}{x+1}}$$

#24 $\left[\dfrac{3x^2+4}{(x^2+1)^2} = \dfrac{Ax+B}{x^2+1} + \dfrac{Cx+D}{(x^2+1)^2}\right](x^2+1)^2$

$$3x^2+4 = (Ax+B)(x^2+1) + Cx + D$$
$$= Ax^3 + Ax + Bx^2 + B + Cx + D$$
$$= Ax^3 + Bx^2 + Ax + Cx + B + D$$
$$(A+C)x$$

$A = 0 \qquad B = 3 \qquad A + C = 0 \qquad B + D = 4$

$C = 0 \qquad D = 1$

$$= \boxed{\frac{3}{x^2+1} + \frac{1}{(x^2+1)^2}}$$

#25 $\left[\dfrac{x^2-x+2}{x^3-2x^2+x} = \dfrac{A}{x} + \dfrac{B}{x-1} + \dfrac{C}{(x-1)^2}\right] x(x-1)^2$

$x(x^2-2x+1)$

$x(x-1)(x-1)$

$x(x-1)^2$

$$\boxed{= \frac{2}{x} + \frac{-1}{x-1} + \frac{2}{(x-1)^2}}$$

$$\begin{aligned} x^2-x+2 &= A(x-1)^2 + B(x)(x-1) + Cx \\ &= A(x^2-2x+1) + Bx^2 - Bx + Cx \\ &= \cancel{Ax^2} - \cancel{2Ax} + A + \cancel{Bx^2} - \cancel{Bx} + \cancel{Cx} \\ &= Ax^2 + Bx^2 - 2Ax - Bx + Cx + A \\ &= (A+B)x^2 + (-2A-B+C)x + A \end{aligned}$$

$A+B=1$ $\quad -2A-B+C=-1$ $\quad \underline{A=2}$

(2)

$\underline{B=-1}$ $\quad -2(2)-(-1)+C=-1$

$-4+1+C=-1$

$\underline{C=2}$

#28 $\left[\dfrac{5x^2+7x-4}{x^3+4x^2} = \dfrac{A}{x} + \dfrac{B}{x^2} + \dfrac{C}{x+4}\right] x^2(x+4)$

$x^2(x+4)$

$$\begin{aligned} 5x^2+7x-4 &= Ax(x+4) + B(x+4) + Cx^2 \\ &= Ax^2 + 4Ax + Bx + 4B + Cx^2 \\ &= Ax^2 + Cx^2 + 4Ax + Bx + 4B \\ &= (A+C)x^2 + (4A+B)x + 4B \end{aligned}$$

$A+C=5$ $\quad 4A+B=7$ $\quad 4B=-4$

$2+C=5$ $\quad 4A-1=7$ $\quad B=-1$

$4A=8$

$C=3$ $\quad A=2$

$$\boxed{= \frac{2}{x} + \frac{-1}{x^2} + \frac{3}{x+4}}$$

#30 $\left[\dfrac{3x^3+6x-1}{(x^2+2)^2} = \dfrac{Ax+B}{x^2+2} + \dfrac{Cx+D}{(x^2+2)^2}\right](x^2+2)^2$

$$\boxed{= \frac{3x}{x^2+2} + \frac{-1}{(x^2+2)^2}}$$

$$3x^3+6x-1 = (Ax+B)(x^2+2) + (Cx+D)$$
$$= \cancel{Ax^3} + \cancel{2Ax} + \cancel{Bx^2} + 2B + \cancel{Cx} + D$$
$$= Ax^3 + Bx^2 + 2Ax + Cx + 2B + D$$
$$(2A+C)x$$

$A = 3$ $\quad$ $B = 0$ $\quad$ $2A + C = 6$ $\quad$ $2B + D = -1$

$2(3) + C = 6$ $\quad$ $D = -1$

$C = 0$

#32 $\left[\dfrac{2x^2-4x+3}{x^3+1} = \dfrac{A}{x+1} + \dfrac{Bx+C}{x^2-x+1}\right](x+1)(x^2-x+1)$

$(x+1)(x^2-x+1)$

$$2x^2-4x+3 = A(x^2-x+1) + (Bx+C)(x+1)$$
$$= \cancel{Ax^2} - \cancel{Ax} + A + \cancel{Bx^2} + \cancel{Bx} + \cancel{Cx} + C$$
$$= Ax^2 + Bx^2 - Ax + Bx + Cx + A + C$$
$$= (A+B)x^2 + (-A+B+C)x + (A+C)$$

$A + B = 2$ $\quad$ $-A + B + C = -4$ $\quad$ $A + C = 3$

$A = 2 - B$ $\quad$ $-A - B = -2$

$C - B = 1$

$-(2-B) + B + 1 + B = -4$ $\quad$ $C = 1 + B$

$-2 + B + B + 1 + B = -4$

$-1 + 3B = -4$

$3B = -3$

$B = -1$

$A = 3$

$C = 0$

$$\boxed{= \frac{3}{x+1} + \frac{-1x}{x^2-x+1}}$$