#1

a) $6x+5=12x-2$

$7=6x$

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

b) $3(x+16)-5(3-x)=12$

$3x+48-15+5x=12$

$8x+33=12$

$8x=-21$

$\boxed{x=\frac{-21}{8}}$

c) $\left(\frac{5}{2}\right)(x+2)-\left(\frac{1}{4}\right)(x+22)=0$

$\frac{5x}{2}+5-\frac{x}{4}-\frac{11}{2}=0$

$\frac{10x}{4}-\frac{x}{4}+\frac{10}{2}-\frac{11}{2}=0$

$\frac{9x}{4}=\frac{1}{2}$

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

#2.

a) $8x^2+2x=0$

$x(8x+2)=0$

$x=0 \quad 8x+2=0$

$8x=-2$

$x=-1/4$

$\boxed{x=-1/4, 0}$

b) $x^2-4x-12=0$

$(x-6)(x+2)=0$

$x-6=0 \quad x+2=0$

$x=6 \quad x=-2$

$\boxed{x=-2, 6}$

c) $8x-x^2=12$

$-x^2+8x-12=0$

$-(-6+x)(-2+x)=0$

$x-6=0 \quad x-2=0$

$x=6 \quad x=2$

$\boxed{x=6, 2}$

d) $3x^2-3x-1=x^2+2x+2$

$2x^2-3x-1=2x+2$

$2x^2-5x-1=2$

$2x^2-5x-3=0$

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

$x-3=0 \quad 2x+1=0$

$x=3 \quad 2x=-1$

$x=-1/2$

$\boxed{x=3, -1/2}$

#3.

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

$x=\frac{3\pm\sqrt{(-3)^2-4(1)(-3)}}{2(1)}=\frac{3\pm\sqrt{9+12}}{2}$

$\boxed{x=\frac{3\pm\sqrt{21}}{2}}$

b) $x^2+21=-9x$

$x^2+9x+21=0$

$x=\frac{-9\pm\sqrt{(9)^2-4(1)(21)}}{2(1)}=\frac{9\pm\sqrt{81-84}}{2}$

$x=\frac{9\pm\sqrt{-3}}{2}=\frac{9\pm i\sqrt{3}}{2}$

$\boxed{\text{No Real Solutions}}$

$\boxed{\text{Complex: } \frac{9\pm i\sqrt{3}}{2}}$

c) $8x=5+2x^2$

$0=2x^2-8x+5$

$x=\frac{8\pm\sqrt{(-8)^2-4(2)(5)}}{2(2)}=\frac{8\pm\sqrt{64-40}}{4}$

$x=\frac{8\pm\sqrt{24}}{4}=\frac{8\pm2\sqrt{6}}{4}=\boxed{\frac{4\pm\sqrt{6}}{2}}$

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

$4x^2-4x+1=3x$

$4x^2-7x+1=0$

$x=\frac{7\pm\sqrt{(-7)^2-4(4)(1)}}{2(4)}=\frac{7\pm\sqrt{49-16}}{8}$

$\boxed{x=\frac{7\pm\sqrt{33}}{8}}$

#4.

a) $(4,4)$ & $(5,-14)$

$$\frac{-14-4}{5-4} = \boxed{-18}$$

b) $(5,-5)$ & $(-4,12)$

$$\frac{12+5}{-4-5} = \boxed{\frac{-17}{9}}$$

c) $(20,15)$ & $(-13,-27)$

$$\frac{-27-15}{-13-20} = \frac{-42}{-33} = \boxed{\frac{14}{11}}$$

#5.

a) pt. $(1,6)$ slope $= \frac{1}{2}$

$$\boxed{\begin{aligned} y-6 &= \tfrac{1}{2}(x-1) \\ y &= \tfrac{1}{2}(x-1)+6 \\ y &= \tfrac{x}{2}+\tfrac{11}{2} \end{aligned}}$$

b) pt. $(-4,13)$ & $(0,0)$

$$\text{slope} = \frac{0-13}{0+4} = -13/4$$

$$\boxed{y = -13/4\,x}$$

c) pt. $(-4,-3)$ & $(0,1)$

$$\text{slope} = \frac{1+3}{0+4} = \frac{4}{4} = 1$$

$$y-1 = x-0$$

$$\boxed{y = x+1}$$