HW 4C.3 #1df, 2eh 4C.4 #2, 4dcf, 6b, 7 (HL)
4C.3 #1df, 2eh 4C.4 #2, 4dcf, 6b (SL)

1d.) $x^2+4x=1$
$x^2+4x-1=0$
$a=1\ b=4\ c=-1$
$\frac{-(4)\pm\sqrt{(4)^2-4(1)(-1)}}{2(1)} \Rightarrow \frac{-4\pm\sqrt{16+4}}{2}$
$x=\frac{-4\pm\sqrt{20}}{2}$ $x=\frac{-4\pm2\sqrt{5}}{2}$ $\boxed{x=-2\pm\sqrt{5}}$

1f.) $2x^2-2x-3=0$
$a=2\ b=-2\ c=-3$
$\frac{-(-2)\pm\sqrt{(-2)^2-4(2)(-3)}}{2(2)} \Rightarrow \frac{2\pm\sqrt{4+24}}{4}$
$x=\frac{2\pm\sqrt{28}}{4}$ $x=\frac{2\pm2\sqrt{7}}{4}$ $\boxed{x=\frac{1\pm\sqrt{7}}{2}}$

2e.) $(x+3)(2x+1)=9$
$2x^2+x+6x+3=9$
$2x^2+7x-6=0$
$a=2\ b=7\ c=-6$
$\frac{-(7)\pm\sqrt{(7)^2-4(2)(-6)}}{2(2)} \Rightarrow \frac{-7\pm\sqrt{49+48}}{4}$
$\boxed{x=\frac{-7\pm\sqrt{97}}{4}}$

2h.) $\left(x-\frac{1}{x}=1\right)(x) \rightarrow x^2-1=x \Rightarrow x^2-x-1=0$
$a=1\ b=-1\ c=-1$
$\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-1)}}{2(1)} \Rightarrow \frac{1\pm\sqrt{1+4}}{2} \Rightarrow \boxed{x=\frac{1\pm\sqrt{5}}{2}}$

2.) $4x^2-4x+1=0$
a.) $(-4)^2-4(4)(1)$
$=16-16$
$\boxed{=0}$
b.) one real root

c.) $(4x^2-2x)(-2x+1)=0$
4, -2, -2, -4
$2x(2x-1)-1(2x-1)=0$
$(2x-1)(2x-1)=0$
$(2x-1)^2=0$
$2x-1=0$
$2x=1$
$\boxed{x=\frac{1}{2}}$

4d.) $5x^2+4x-3=0$ $b^2-4ac=(4)^2-4(5)(-3)=16+60=\boxed{76}$

positive, non-square → **2 real, irrational roots**

4e.) $x^2+x+5=0$ $b^2-4ac=(1)^2-4(1)(5)=1-20=\boxed{-19}$

negative → **no real roots**

4f.) $16x^2-8x+1=0$ $b^2-4ac=(-8)^2-4(16)(1)=64-64=\boxed{0}$

zero → **one repeated real root**

6b.) $mx^2+3x+2=0$ $b^2-4ac=(3)^2-4(m)(2)=9-8m$

i. $\Delta=0$: $9-8m=0$, $-8m=-9$, $\boxed{m=9/8}$

ii. $\Delta>0$: $9-8m>0$, $-8m>-9$, $\boxed{m<9/8}$

iii. $\Delta<0$: $9-8m<0$, $-8m<-9$, $\boxed{m>9/8}$

7.) HL Only: $4x^2+kx+(3-k)=0$ repeated root $\therefore \Delta=0$

$b^2-4ac=(k)^2-4(4)(3-k) \Rightarrow k^2-16(3-k) \Rightarrow k^2-48+16k$

$\therefore k^2+16k-48=0$

$k^2+16k+\underline{8^2}=48+\underline{64}$

$\sqrt{(k+8)^2} \neq \sqrt{112}$

$k+8=\pm\sqrt{112}$

$k+8=\pm 4\sqrt{7}$

$\therefore \boxed{k=-8\pm 4\sqrt{7}}$

when $\Delta=0$, the repeated root $=\frac{-b}{2a}$

$\therefore$ when $k=-8+4\sqrt{7}$

the root is $\frac{-(-8+4\sqrt{7})}{2(4)}$

$\Rightarrow \frac{8-4\sqrt{7}}{8} = \boxed{\frac{1-\sqrt{7}}{2}}$

$\neq$ when $k=-8-4\sqrt{7}$

the root is $\frac{-(-8-4\sqrt{7})}{2(4)}$

$\Rightarrow \frac{8+4\sqrt{7}}{8} = \boxed{\frac{1+\sqrt{7}}{2}}$