1. a1 = 1

a2 = 3

an = 5an-1 – 6an-2

characteristic equation: r2- 5r + 6 = 0 ≡ (r – 2) (r – 3) = 0

solutions: r = 2 and 4

general solution: an = c2n + d3n

a1 = 1 = c(2) + d(3)

c = (1 – 3d)/2

a­2 = 3 = c(4) + d(9)

= 4(1 – 3d)/2 + 9d

= 2 – 6d + 9d

d = 1/3

c = (1 – 3d)/2 = 0

**a­n = 3n-1**

Skip 2: I am tired.

8. a) linear homogenous, degree 2

b) linear but not homogeneous, degree 0

c) not linear, degree 1

d) linear homogeneous, degree 3

e) not linear, degree 1

f) linear but not homogeneous, degree 3

g) linear homogeneous, degree 7

9.

summary:

a) **an = 3/5(-2)n + 12/5(3n)**

b) **an = 3(2n) – 5n**

**c) an = 3(2n) + 4n**

d) **an = 4 – 3n**

**e) an = 2 + 3(-1)n**

**f) an = 3(-3)n - 2n(-3)n**

**g) an = 3 – (-5)n**

a) a0 = 3

a1 = 6

an = an-1 + 6an-2 for n > 1

characteristic equation: r2 – r – 6 = 0 ≡ (r + 2)(r - 3) = 0

solutions: r = -2, r = 3

general solution: an = c(-2)n + d3n

a0 = 3 = c(-2)0 + d30 = c + d

c = 3 - d

a1 = 6 = c(-2)1 + d31

= 3d - 2c

= 3d – 2(3 – d)

= 5d - 6

d = 12/5

c = 3 – d = 3/5

So **an = 3/5(-2)n + 12/5(3n)**

b) a0 = 2

a1 = 1

a­n = 7an-1 -10an-2 for n > 1

characteristic equation: r2 – 7r + 10 = 0 ≡ (r – 2)(r – 5) = 0

solutions: r = 2 and 5

general solution: an = c2n + d5n

a0 = 2 = c20 + d50 = c + d

c = 2 – d

a1 = 1 = c21 + d51

= 2c + 5d

= 2(2-d) + 5d

= 4 + 3d

d = -1

c = 2 – d = 3

**an = 3(2n) – 5n**

c) a0 = 4

a1 = 10

an = 6an-1 – 8a­n-2 for n > 1

characteristic equation: r2 – 6r + 8 = 0 ≡ (r – 2)(r – 4) = 0

solutions: r = 2 and 4

general solution: an = c2n + d4n

a0 = 4 = c20 + d40

= c + d

c = 4 – d

a1 = 10 = c21 + d41

= 2c + 4d

= 2(4 – d) + 4d

d = 1

c = 3

**an = 3(2n) + 4n**

d) a0 = 4

a1 = 1

a­n = 2an-1 – an-2 for n > 1

characteristic equation: r2 – 2r + 1 = 0 ≡ (r – 1)2 = 0

solutions: r = 1 (multiplicity 2)

general solution: an = c(1n) + dn(1n) = c + dn

a0 = 4 = c + d(0) = c

c = 4

a1 = 1 = c + d(1) = 4 + d

d = -3

**an = 4 – 3n**

e) a0 = 5

a1 = -1

an = an-2 for n > 1

characteristic equation: r2 – 1 = 0 ≡ (r – 1)(r + 1) = 0

solution: r = 1 and -1

general solution: c + d(-1)n

a0 = 5 = c + d

c = 5 - d

a1 = -1 = c – d

= (5 – d) – d

= 5 – 2d

d = 3

c = 2

**an = 2 + 3(-1)n**

f) a0 = 3

a1 = -3

an = -6an-1 – 9an-2 for n > 1

characteristic equation: r2 + 6r + 9 = 0 ≡ (r + 3)2 = 0

solution: r = -3 (multiplicity 2)

general solution: c(-3)n + dn(-3)n

a0 = 3 = c(-3)0 + d(0)(-3)0

= c

c = 3

a1 = -3 = c(-3)1 + d(1)(-3)1

= -3c - 3d

= -9 - 3d

d = -2

c = 3

**an = 3(-3)n - 2n(-3)n**

g) a0 = 2

a1 = 8

an+2 = -4an+1 + 5a­n

First, shift to standard form:

an = -4an-1 + 5a­n-2

characteristic equation: r2 + 4r – 5 = 0 ≡ (r + 5)(r – 1) = 0

solutions: r = 1 and -5

general solution: an = c1n + d(-5)n = c + d(-5)n

a0 = 2 = c + d(-5)0 = c + d

c = 2 – d

a1 = 8 = c + d(-5)1 = c – 5d = 2 – d – 5d = 2 – 6d

d = -1

c = 3

**an = 3 – (-5)n**