

Ex 1.

$$1) a_n = 6a_{n-1} - 9a_{n-2} \quad a_0 = 2, a_1 = 3$$

$$\begin{aligned} a_2 &= 6a_1 - 9a_0 \\ &= 6(3) - 9(2) \\ a_2 &\leq 0 \end{aligned}$$

$$\begin{aligned} a_3 &= 6a_2 - 9a_1 = 6(0) - 9(3) \\ &\equiv -18 \end{aligned}$$

$$\begin{aligned} a_4 &= 6a_3 - 9a_2 = 6(-18) - 9(0) \\ &\equiv -108 \end{aligned}$$

$$\begin{aligned} a_5 &= 6a_4 - 9a_3 = 6(-108) - 9(-18) \\ &\equiv -486 \end{aligned}$$

$$\begin{aligned} a_6 &= 6a_5 - 9a_4 = 6(-486) - 9(-108) \\ &\equiv -1944 \end{aligned}$$

$$\therefore 2, 3, 0, -18, -108, -486, -1944 \dots$$

$$2) a_n = 2a_{n-1} - a_{n-2} \quad a_0 = 5, a_1 = 3$$

$$a_2 = 2a_1 - a_0 = 2(3) - 5 \\ = 1$$

~~$$a_3 = 2a_2 - a_1 = 2(1) - 3 \\ = -1$$~~

$$a_4 = 2a_3 - a_2 = 2(-1) - 1 \\ = -3$$

$$a_5 = 2a_4 - a_3 = 2(-3) - (-1) \\ = -5$$

$$a_6 = 2a_5 - a_4 = 2(-5) - (-3) \\ = -7$$

$\therefore 5, 3, 1, -1, -3, -5, -7 \dots$

Ex. 4

$$S_3 = 2S_2 + S_1 - S_0 = 2(4) + (-1) - 2 \\ = 5$$

$$S_4 = 2S_3 + S_2 - S_1 = 2(5) + 4 - (-1) \\ = 15$$

$$S_5 = 2S_4 + S_3 - S_2 = 2(15) + 5 - 4 \\ = 31$$

$$\therefore S_5 = 31$$

Ex. 5

$$b_n = 1.015(b_{n-1}) - 25, \quad b_0 = 280$$

Ex. 6

```
S(n) {
```

```
    if (n == 1)
```

```
        return 3
```

```
    return S(n-1) + 3 * n
```

```
}
```

Ex. 4

$$S_3 = 2S_2 + S_1 - S_0 = 2(4) + (-1) - 2 \\ = 5$$

$$S_4 = 2S_3 + S_2 - S_1 = 2(5) + 4 - (-1) \\ = 15$$

$$S_5 = 2S_4 + S_3 - S_2 = 2(15) + 5 - 4 \\ = 31$$

$$\therefore S_5 = 31$$

Ex. 5

$$b_n = 1.015(b_{n-1}) - 25, \quad b_0 = 280$$

Ex. 6

```
S(n) {
```

```
    if (n == 1)
```

```
        return 3
```

```
    return S(n-1) + 3 * n
```

```
}
```

Ex. 7

1. Let  $B_n$  = number of bacteria after  $n$  hours.

$$B_n = 3B_{n-1}$$

$$(b) \quad B_0 = 10$$

$$\begin{aligned} B_n &= 3B_{n-1} \\ &= 3^n (B_0) \\ B_n &= 10(3^n) \end{aligned}$$

$$B_{10} = 10(3^{10})$$

$$B_{10} = 590490$$

$$\begin{aligned} 2. \text{ Interest} &= \frac{0.08}{12} B(k-1) \\ &= \frac{1}{150} B(k-1) \end{aligned}$$

$$\begin{aligned} B(k) &= B(k-1) + r - 150 \\ &= B(k-1) + \frac{1}{150} B(k-1) - 150 \\ B(k) &= \frac{151}{150} B(k-1) - 150, \quad B(0) = 9000 \end{aligned}$$

$$3. \quad (n+1)^2 = n^2 + 2n + 1$$

$$n^2 = (n-1)^2 + 2(n-1) + 1$$

square(n) {

    if ( $n = 0$ )

        return 0

    return square(n-1) + 2\*(n-1) + 1

Ex. 8

$$a_n \begin{cases} a_1 = 2 \\ a_2 = 3 \\ a_n = a_{n-1}a_{n-2}, n \geq 3 \end{cases}$$

a(n) {

if (n=1)

return 2

else if (n=2)

return 3

return a(n-1) \* a(n-2)

}

~~out~~)

$a(7)$

$n=7$

Because  $n \neq 1$  and  $n \neq 2$

return  $a(6) * a(5)$

$$a(7) = 1944 * 108$$

$$= 209952$$

return 209952

$a(6)$

$n=6$

Because  $n \neq 1$  and  $n \neq 2$

return  $a(5) * a(4)$

$$a(6) = 108 * 18 = 1944$$

return 1944

$a(5)$

$n=5$

Because  $n \neq 1$  and  $n \neq 2$

return  $a(4) * a(3)$

$$a(5) = a(4) * a(3)$$

$$= 18 * 6 = 108$$

return 108

$a(4)$

$n=4$

Because  $n \neq 1$  and  $n \neq 2$

return  $a(3) * a(2)$

$$a(4) = 6 * 3 = 18$$

return 18

$a(3)$

$n=3$

Because  $n \neq 1$  and  $n \neq 2$

return  $a(2) * a(1)$

$$a(3) = 3 * 2 = 6$$

return 6

$a(2)$

$n=2$

Because  $n=2$   
return 3

$a(1)$

$n=1$

Because  $n=1$   
return 2

∴ The answer is 209952.

@

$a_7 = 209952$