Homework 3: 6th Edition

Section 2.5

5) Solve the recurrence relation

\[ S(1) = 1 \]
\[ S(n) = S(n-1) + 2n - 1 \quad \text{for} \quad n \geq 2 \]

9) \[ P(1) = 2 \]
\[ P(n) = 3(n+1)P(n-1) \quad \text{for} \quad n \geq 2 \]

12) Spam e-mail containing a virus is sent to 1000 e-mail addresses. After 1 second, a recipient machine broadcasts 10 new spam e-mails containing the virus, after which the virus disables itself on that machine. How many e-mails are sent out at the end of 20 seconds?

Solve the recurrence relation subject to initial conditions

21) \[ T(1) = 5 \]
\[ T(2) = 11 \]
\[ T(n) = 5T(n-1) - 6T(n-2) \quad \text{for} \quad n \geq 3 \]

26) \[ T(1) = -1 \]
\[ T(2) = 7 \]
\[ T(n) = -4T(n-1) - 3T(n-2) \quad \text{for} \quad n \geq 3 \]

40) Solve the recurrence relation subject to basis step.
(Note: \( 2^{\log n} = n \))

\[ S(1) = 1 \]
\[ S(n) = 2S\left(\frac{n}{2}\right) + n \quad \text{for} \quad n \geq 2, \quad n = 2^m \]