Activity 2

Problem 1:

a) $T(n) = T(n-2) + c$

b) $T(n) = T(n-2) + c$

$= T(n-4) + c + c$

$= T(n-6) + c + c + c$

$\vdots$

$= T(n-2k) + kc$

Stop when $k = n/2$

$T(n) = T(0) + \frac{n}{2} \cdot c$

$T(n) = \frac{cn}{2} = \Theta(n)$

Problem 2:

a) $T(n) = 2T(\frac{n}{4}) + cn^2$

Solve using the Master theorem

b) $a = 2$, $b = 4$ $f(n) = cn^2$

$\log_b a = \log_4 2 = 1/2$

$f(n) = \Omega(n^{1/2})$

$\therefore T(n) = \Theta(n^2)$

Problem 3

a) $T_v(n) = 3\,T_v\left(\frac{n}{2}\right) + cn/4$

Solve using Master theorem

b) $a = 3$, $b = 2$, $f(n) = cn/4$

$\log_2 3 = \lg 3$

$f(n) = O(n^{\lg 3})$

$\therefore\ T_v(n) = \Theta(n^{\lg 3})$

Extra Credit

$T_c(n) = 2\,T_c\left(\frac{n}{2}\right) + \Theta(n^{\lg 3})$

Solve using Master theorem

$a = 2$, $b = 2$ $\log_2 2 = 1$ $f(n) = n^{\lg 3}$

$f(n) = \Omega(n^1)$

$\therefore\ T(n) = \Theta(n^{\lg 3})$