HW #4 Solution.

(1) $D(i,j) = \min \{ 1 + D(i-1, j),\ 1 + D(i, j-1),\ diff(i,j) + D(i-1, j-1) \}$

where $diff(i,j) = \begin{cases} 1 & \text{if } x[i] \neq y[j] \\ 0 & \text{otherwise.} \end{cases}$

for $i = 0, 1, \ldots, m$
  $D(i,0) = i$

for $j = 1, 2, \ldots n$
  $D(0,j) = j$

for $i = 1, 2, \ldots, m$
  for $j = 1, 2, \ldots, n$
    $D(i,j) = \min \{ D(i-1,j)+1,\ D(i,j-1)+1,\ D(i-1,j-1) + diff(i,j) \}$

return $D(m,n)$

Running time $\Theta(mn)$.

(2) $K(w) = \max_{i : w_i \leq w} \{ K(w - w_i) + v_i \}$

~~$K(0) = 0$~~
~~for $w = 1$ to~~
~~$K(w) = \max$~~

$K(0) = 0$

for $\omega = 1$ to W

  $K(\omega) = 0$

  for $i = 1$ to n

    if $w_i \leq \omega$

      $K(\omega) = \max\{ K(\omega), K(\omega - w_i) + v_i \}$

Return $K(W)$

Running time $\Theta(nW)$.

(3) $R(j) = \max\{ R(j-1), R(\text{prev}[j]) + p[j] \}$

where $R(j-1)$ means don't place a bill board at $x[j]$

and $R(\text{prev}[j]) + p[j]$ means place bill board at $x[j]$.

$R[0] = 0$

for $j = 1$ to n

  $R[j] = \max\{ R(j-1), R(\text{prev}[j]) + p[j] \}$

Return $R(n)$

Running time $\Theta(n)$.