Computational Approach to solving Consea-Krueger Model:

1. Initialize the algorithm: Set parameters, grid bounds, number of grid points. The states of the economy are age j, assets a and productivity z. Initialize (i.e give an initial guess) asset and labor policy function and value function, stationary distribution (μ) , and aggregate variables (K and L). Given the aggregate variables, we can derive the prices (w, b and r).

2. Backward Induction: Take as given aggregate variables (K and L) – and thus by extension prices (w, b and r). Solve household's decision problem taking as given next age's value function $V(j+1, a', z')$. Once done, you should get out value $V(j, a, z)$, asset policy function $a(j, a, z)$, and labor policy function $l(j, a, z)$ at each stage of the agent's life (j).

   – Note: there is no need to 'iterate until convergence'. Since we are doing backward induction, we only need to solve backward once.

   – This is exercise 1 in the problem set.

3. Stationary Distribution: Take as given policy function solved for in (2). Calculate the stationary asset distribution following the law of motion.

   – Note: again, there is no 'iterate until convergence' here. We assume that when agents are born ($j = 1$) they come in with zero assets and their productivity is drawn from the invariant Markov distribution (Dean gives the probabilities in the problem set).

   – Note: the pset notes that the relative size of each age cohort is decreasing.

   – This is exercise 2 in the problem set.

4. Capital and Labor Market Clearing: Taking as given the policy function solved for in (2) and stationary distribution solved for in (3), calculate new aggregate capital and labor from the formula given in the problem set.

   – Note: This is just one big sum over all the states and corresponding asset decision (from the policy function) and distribution weight

If market clearing condition is met – that is, if Capital and Labor supply (approximately) equal Capital and Labor demand – you are done. Otherwise, 'update' K and L from the formula given by Dean, and update the wage, interest rate, and benefits too. Then repeat steps (2) - (4).

– This is exercise 3 in the problem set.

Pseudo Code to Solve Consea-Krueger Model (steps (2) - (4)):

Algorithm 1 Consea-Krueger

```
procedure MAIN CODE
    K_0 = K_init & L_0 = L_init                    ▷ Hint: K_init = 3.3 & L_init = 0.3
    Given {K_0, L_0} solve for {w, r, b}

    convergence flag = 0
    while convergence flag = 0 do
        call BACKWARDINDUCTION( )
        return {V(j, a, z), a'(j, a, z), l(j, a, z)}

        call CALCULATESTATDIST( )
        return μ(j, a, z)

        call CALCULATEMARKETCLEARING( )
        return {K_1, L_1}

        if |K_1 − K_0| + |L_1 − L_0| > ϵ then      ▷ Changing λ will vary convergence speed
            K_0 ← λK_1 + (1 − λ)K_0
            L_0 ← λL_1 + (1 − λ)L_0
        else if |K_1 − K_0| + |L_1 − L_0| < ϵ then
            return convergence flag = 1
        end if

    end while
end procedure
```

```
function BackwardInduction( )
    for j = j_N : -1 : 1 do                                        ▷ Backward Induction
        for a = 1 : n_a;  z = 1 : n_z do
            Solve HH Problem      ▷ Separate problem for end of life, retirees, and workers
            V(j, a, z) = u(c, l) + βE_{z'}{V(j + 1, a', z')}       ▷ Continuation Value
        end for
    end for
    return {V(j, a, z), a'(j, a, z), l(j, a, z)}
end function

function CalculateStatDist( )
    Define μ(1, 0, z = z^H) = 0.2037/ Σ_{j=0}^{j_n−1} (1/(1+n))^j
    Define μ(1, 0, z = z^L) = 0.7963/ Σ_{j=0}^{j_n−1} (1/(1+n))^j
    Construct Π_{n_a n_z × n_a n_z}(j)                             ▷ Π depends on agent's age
    Update μ(j + 1, a, z) = Π(j)'μ(j, a, z) 1/(1+n)
    return μ(j, a, z)
end function

function CalculateMarketClearing( )
    Use formulas Dean gives in the problem set.
    return {K_1, L_1}
end function
```