I. Labor supply effects of a no exemption NIT plan (R = 0)

A. Program parameters: \( G, t, Y_e = \frac{G}{t} \)

1. \( \text{NIT} = G - tY \) for \( Y \leq Y_e \)

2. New budget line: \( Y = \text{NIT} + wh + I \)
   \[ = G - t(wh + I) + wh + I \]
   \[ = G + (1-t)(wh + I) \]
   \[ = G + (1-t)I + (1-t)wh \]

3. Break-even hours of work at wage \( w \): \( h_e = \frac{Y_e - I}{w} \)

4. Changes in nonlabor income and wages for someone on the program
   a. \( \Delta I = G + (1-t)I - I \) or

   \[
   \Delta I = G - tI
   \]

   b. \( \Delta w = (1-t)w - w \) or

   \[
   \Delta w = -tw
   \]

5. Approximate change in hours of work for someone who opts for the program.
   a. The ordinary (uncompensated) labor supply function: \( h = h(w,I) \)
   b. The change in hours is given by

   \[
   dh = \frac{\partial h}{\partial w} dw + \frac{\partial h}{\partial I} dI
   \]
   \[ = -tw \frac{\partial h}{\partial w} + (G - tI) \frac{\partial h}{\partial I}, \text{ for } dw = -tw \text{ and } dI = G - tI \]
   \[ = -tw \left[ S + h_0 \frac{\partial h}{\partial I} \right] + (G - tI) \frac{\partial h}{\partial I} \text{ (since } \frac{\partial h}{\partial w} = S + h_0 \frac{\partial h}{\partial I} \text{)} \]
   \[ = -twS - twh_0 \frac{\partial h}{\partial I} + (G - tI) \frac{\partial h}{\partial I} \]

   where \( -twS \) is the substitution effect of the wage change,

   \( -twh_0 \frac{\partial h}{\partial I} \) is the income effect of the wage change, and

   \( (G - tI) \frac{\partial h}{\partial I} \) is the pure income effect of the program.
c. Let $h_0$ and $h_1$ represent labor supply before and after the program, respectively.

   (1) If the individual does not opt for the program, set $dh = 0$ so that $h_1 = h_0$.

   (2) If the individual opts for the program

      and $dh + h_0 \geq T$, set $h_1 = T$;

      or if $dh + h_0 \leq 0$, set $h_1 = 0$;

      otherwise $h_1 = dh + h_0$.

6. Discrete or actual change in hours of work for someone who opts for the program.

   a. $h_0 = h(W, I)$ and $\tilde{h} = h((1-t)w, G+(1-t)I)$.

   b. $\Delta h = \tilde{h} - h_0$

      = $h((1-t)w, G+(1-t)I) - h(w, I)$.

      (1) If the individual does not opt for the program,

         $\Delta h = 0$ and $h_1 = h_0$.

      (2) If the individual opts for the program

         and $\tilde{h} \geq T$, set $h_1 = T$;

         or if $\tilde{h} \leq 0$, set $h_1 = 0$;

         otherwise $h_1 = \tilde{h}$.

7. Computation of income changes for one who opts for the program.

   a. $\Delta Y = Y_1 - Y_0$

      where $Y_1 = G + (1-t)(wh_1 + I)$ (after)

      and $Y_0 = wh_0 + I$ (before).

   b. $NIT = G - t(wh_1 + I)$. 
B. Suppose $h_e > T$

1. The individual would definitely opt for the program.

2. $Y_e = \frac{G}{t} > wT + I$

3. $G + (1-t)I > I$ and $G + (1-t)(wT + I) > wT + I$
C. Suppose $0 < h_e \leq T$

1. $0 < h_0 < h_e$
   
   a. The individual would definitely opt for the program.
   
   b. Hours of work greater than $h_e$ could have been selected before and were not, therefore the individual would be better off somewhere along the new budget line up to $h_e$.

2. Suppose $h_e \leq h_0 \leq T$
   
   a. One cannot tell whether or not the individual will opt for the program without knowledge of the individual's utility function.
   
   b. If $U(Y_0, h_0) \geq U(Y_1, h_1)$, then the individual would not opt for the program.
   
   c. If $U(Y_0, h_0) < U(Y_1, h_1)$, then the individual would opt for the program.
D. Suppose $h_e \leq 0$

1. The individual will *not* opt for the program.

2. $G + (1-t)I \leq T$.

3. $Y_e = \frac{G}{t} \leq I$. 
Numerical Example of the NIT Impact on Labor Supply

Let $G = 4800/yr$, $t = \frac{1}{2}$, $R = 0$, then $Y_e = \frac{G}{t} = \frac{4800}{\frac{1}{2}} = 9600/yr$.

If $Y < 9600$, then

$\text{NIT} = 4800 - \frac{1}{2} Y$, and

$Y_T = 4800 + \frac{1}{2} Y$.

Consider the case of an individual with the following circumstances:

$w = 4.00/\text{hr}$, $h_0 = 2000 \text{ hrs./yr}$, and $I = 0$.

Therefore $Y = 4h \Rightarrow Y_0 = (4)(2000) = 8000$

$h_o = \frac{Y_o - I}{w}$

$= \frac{9600 - 0}{4}$

$= 2400 \text{ hrs/yr}$.

Since $h_0 = 2000 < 2400$, the individual would definitely opt for the program.

$\Delta I = G + (1-t)I - I$

$= G - tI$

$= 4800 - \left(\frac{1}{2}\right)(0)$

$\boxed{\Delta I = 4800}$

$\Delta w = -tw$

$= -\left(\frac{1}{2}\right)(4)$

$\boxed{\Delta w = -2}$
Suppose the labor supply function is given by the following Ashenfelter-Heckman type:

\[ \Delta h = 33.5 \Delta w - 0.035(h^* \Delta w + \Delta I) \]

\[ = 33.5 \Delta w - 0.035 h^* \Delta w - 0.035 \Delta I \]

\[ = (33.5)(-2) - (0.035)(2000)(-2) - (0.035)(4800) \] (letting \( h^* = h_0 = 2000 \))

\[ = -67 + 140 - 168 \]

(S.E. of \( \Delta w \)) \hspace{1cm} (I.E. of \( \Delta w \)) \hspace{1cm} (pure I.E. of \( \Delta I \))

\[ \Delta h = -95 \text{ hrs} \]