Exercises on cfg notation

$E \rightarrow E + T \mid T$
$T \rightarrow T * P \mid P$
$P \rightarrow id \mid int \mid (\ P\ )$

- **Parse tree for:** `x * 10 + y`**:**

- **Give examples of each:**
  - **E-sentence:** **T-sentence:**
  - **E-sentential form that is not a sentence:**

More exercises on cfg notation

$E \rightarrow EA$
$A \rightarrow \epsilon \mid A + T$
$T \rightarrow T(*P)^*$
$P \rightarrow id \mid int \mid (\ P\ )$

- **Transform this grammar to remove the Kleene star.**

- **Show that both `E+T` and `EA+T` are sentential forms:**

- G_A: **E** $\rightarrow$ **id** | **E - E** | **E * E**
  - **x - y * z** **x - y - z**

- **Ambiguous?** **Precedence?** **Associativity?**

- G_B: **E** $\rightarrow$ **id** | **id - E** | **id * E**
  - **x - y * z**
  - **x - y * z - w**
  - **x * y - z**
- **Ambiguous?** **Precedence?** **Associativity?**

- G_C: **E** $\rightarrow$ **id** | **E - id** | **E * id**
  - **x - y * z**
  - **x - y * z - w**
  - **x * y - z**
- **Ambiguous?** **Precedence?** **Associativity?**

- G_D: **E** $\rightarrow$ **T - E** | **T**
  T $\rightarrow$ **id** | **id * T**

  - **x - y * z** **x * y - z** **x - y - z**

- **Ambiguous?** **Precedence?** **Associativity?**

- G_E: **E** $\rightarrow$ **E - T** | **T**
  T $\rightarrow$ **id** | **T * id**

  - **x - y * z** **x * y - z** **x - y - z**

- **Ambiguous?** **Precedence?** **Associativity?**

- G_F: $\mathbf{E} \rightarrow \mathbf{T}\ \mathbf{E}'$
  $\mathbf{E}' \rightarrow \epsilon \mid \mathbf{-}\ \mathbf{E}$
  $\mathbf{T} \rightarrow \mathbf{id}\ \mathbf{T}'$
  $\mathbf{T}' \rightarrow \epsilon \mid \mathbf{*}\ \mathbf{T}$

- **x - y * z** **x * y - z** **x - y - z**

- **Ambiguous?** **Precedence?** **Associativity?**