Consider S and T as variables and the following relation representing the relationships:

(i) a: ¬(S∨T)

(ii) b: (S&T)

(iii) c: T∨¬T

(iv) d: ¬(S□S)

(v) e: ¬S ¬T

Analyze the following for PL-TT entailment and show whether

(i). 'a' entails 'b',

(ii). 'a' entails 'c',

(iii). 'a' entails 'd' and

(iv). 'a' entails 'e'

INPUT:

```python
s=True
t=True
a = not(s or t)
print(a)
b = s and t
print(b)
c = t or(not t)
print(c)
d = not((not s or s) and (not s or s))
print(d)
e = not(not s) and (not t)
print(e)

if a==b:
    print("a entails b")
if a==c:
    print("a entails c")
if a==d:
    print("a entails d")
if a==e:
    print("a entails e")
else:
    print("no entailment")
```

OUTPUT:

```
C:\Users\Madhan\PycharmProjects\main\venv\Scripts\python.exe C:/Users/Madhan/PycharmProjects/main/madan.py
False
True
True
False
False
a entails d
a entails e
```

```python
s=True
t=False
a = not(s or t)
print(a)
b = s and t
print(b)
c = t or(not t)
print(c)
d = not((not s or s) and (not s or s))
print(d)
e = not(not s) and (not t)
print(e)

if a==b:
    print("a entails b")
if a==c:
    print("a entails c")
if a==d:
    print("a entails d")
if a==e:
    print("a entails e")
else:
    print("no entailment")
```

```
C:\Users\Madhan\PycharmProjects\main\venv\Scripts\python.exe C:/Users/Madhan/PycharmProjects/main/madan.py
False
False
True
False
True
a entails b
a entails d
no entailment
```

```python
s=False
t=True
a = not(s or t)
print(a)
b = s and t
print(b)
c = t or(not t)
print(c)
d = not((not s or s) and (not s or s))
print(d)
e = not(not s) and (not t)
print(e)

if a==b:
    print("a entails b")
if a==c:
    print("a entails c")
if a==d:
    print("a entails d")
if a==e:
    print("a entails e")
else:
    print("no entailment")
```

OUTPUT:

```
C:\Users\Madhan\PycharmProjects\main\venv\Scripts\python.exe C:/Users/Madhan/PycharmProjects/main/madan.py
False
False
True
False
False
a entails b
a entails d
a entails e
```

```python
s=False
t=False
a = not(s or t)
print(a)
b = s and t
print(b)
c = t or(not t)
print(c)
d = not((not s or s) and (not s or s))
print(d)
e = not(not s) and (not t)
print(e)

if a==b:
    print("a entails b")
if a==c:
    print("a entails c")
if a==d:
    print("a entails d")
if a==e:
    print("a entails e")
else:
    print("no entailment")
```

OUTPUT:

```
C:\Users\Madhan\PycharmProjects\main\venv\Scripts\python.exe C:/Users/Madhan/PycharmProjects/main/madan.py
True
False
True
False
False
a entails c
no entailment
```