

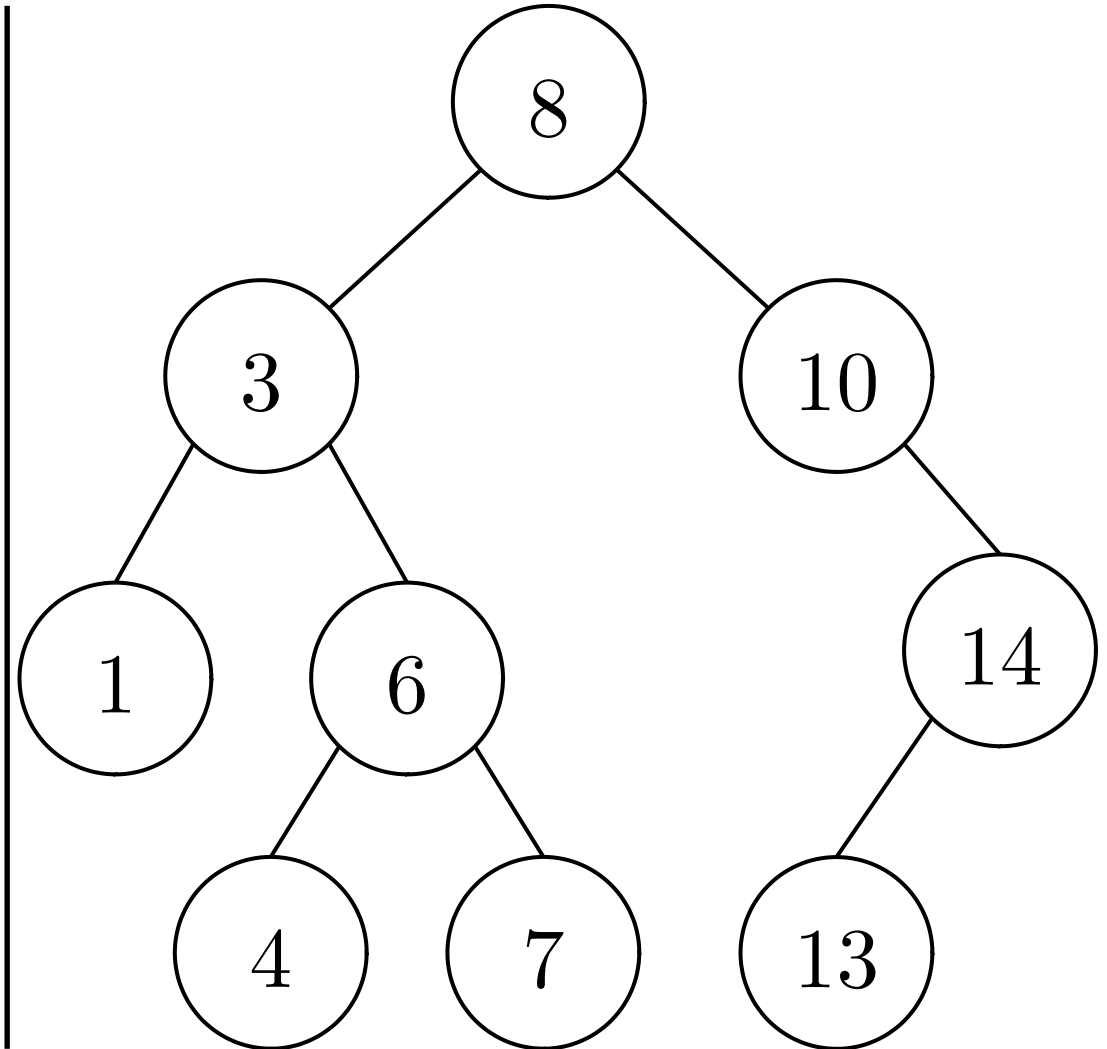


PUC-SP

busca em largura

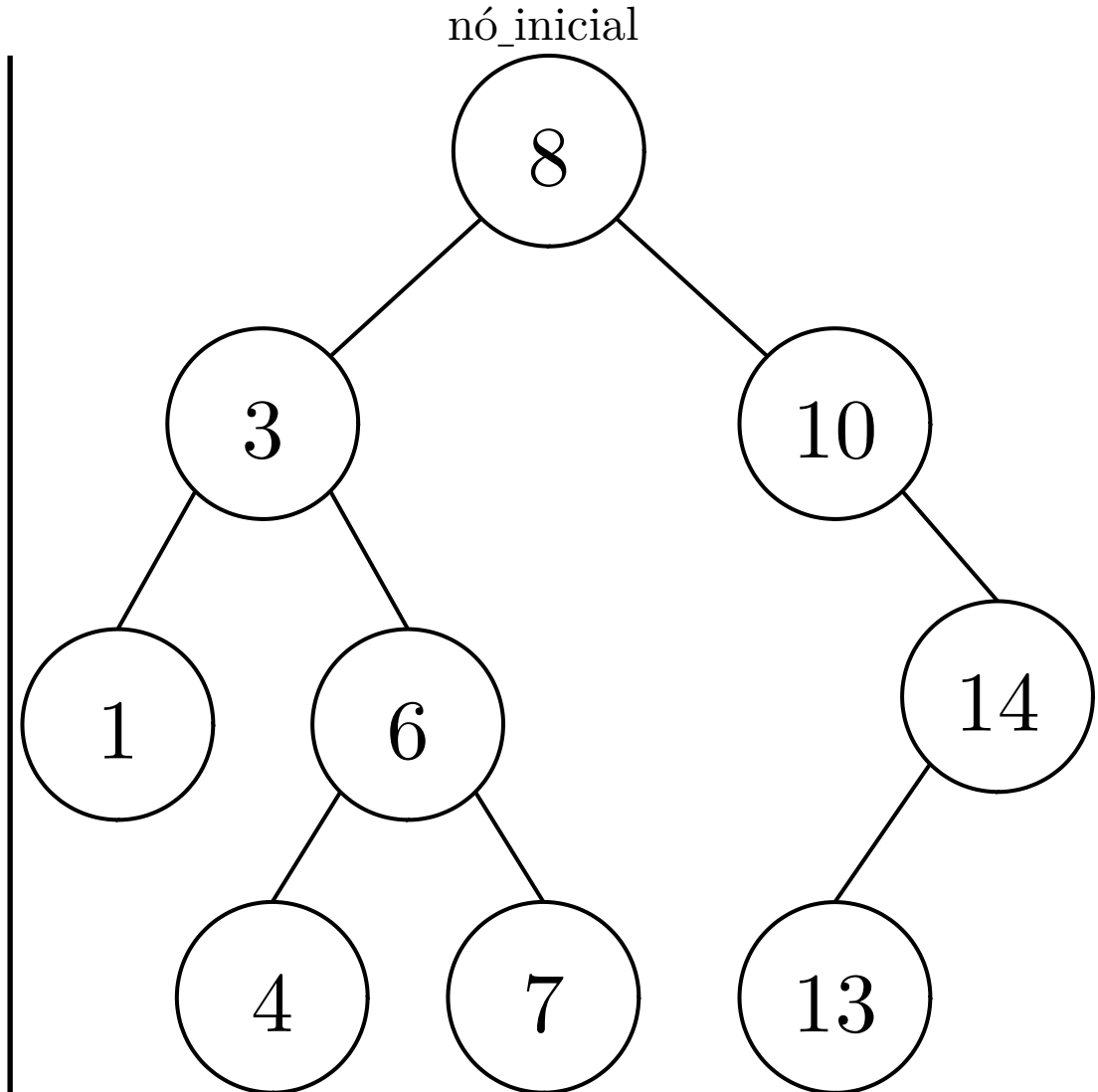
busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```



busca em largura

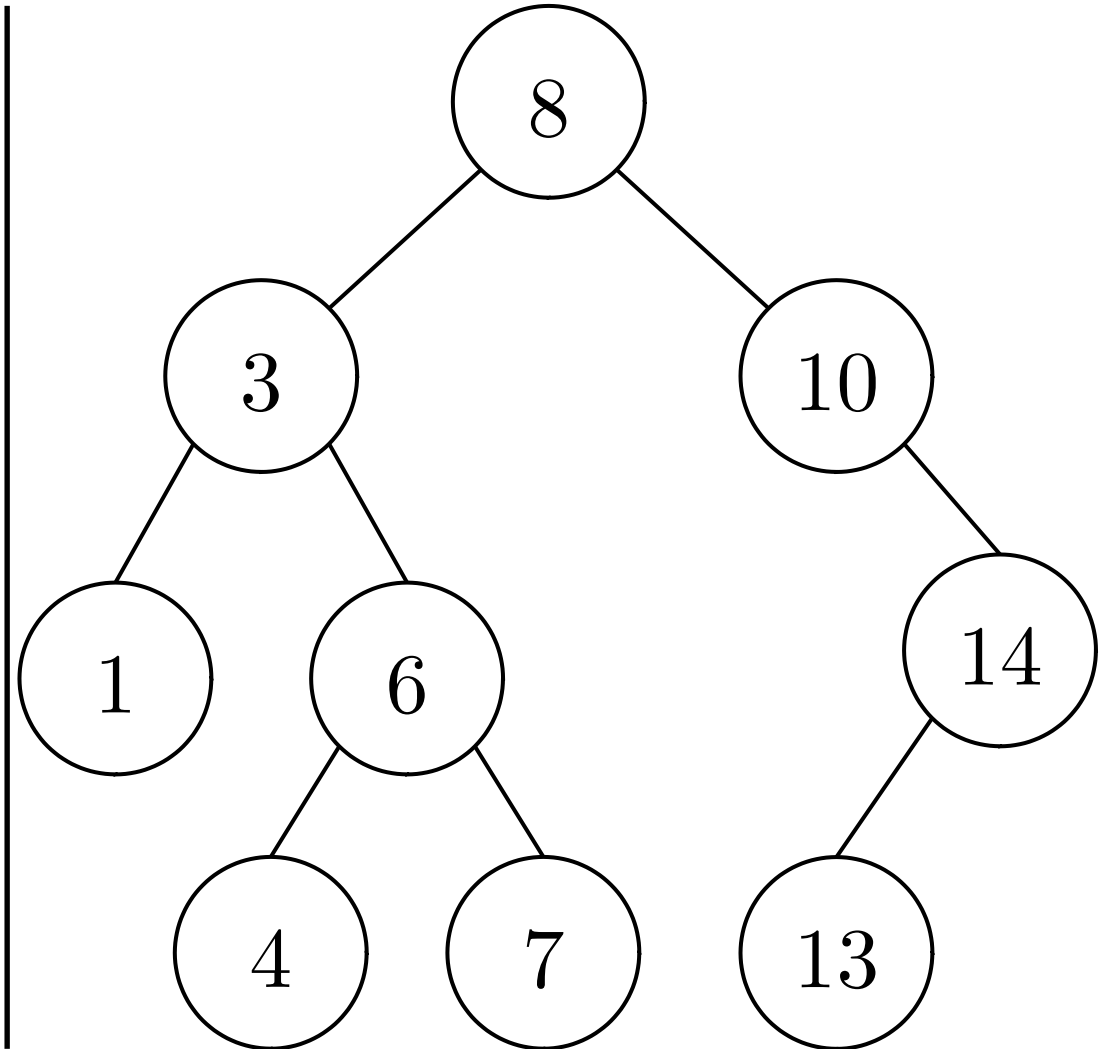
```
➡ def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
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busca em largura

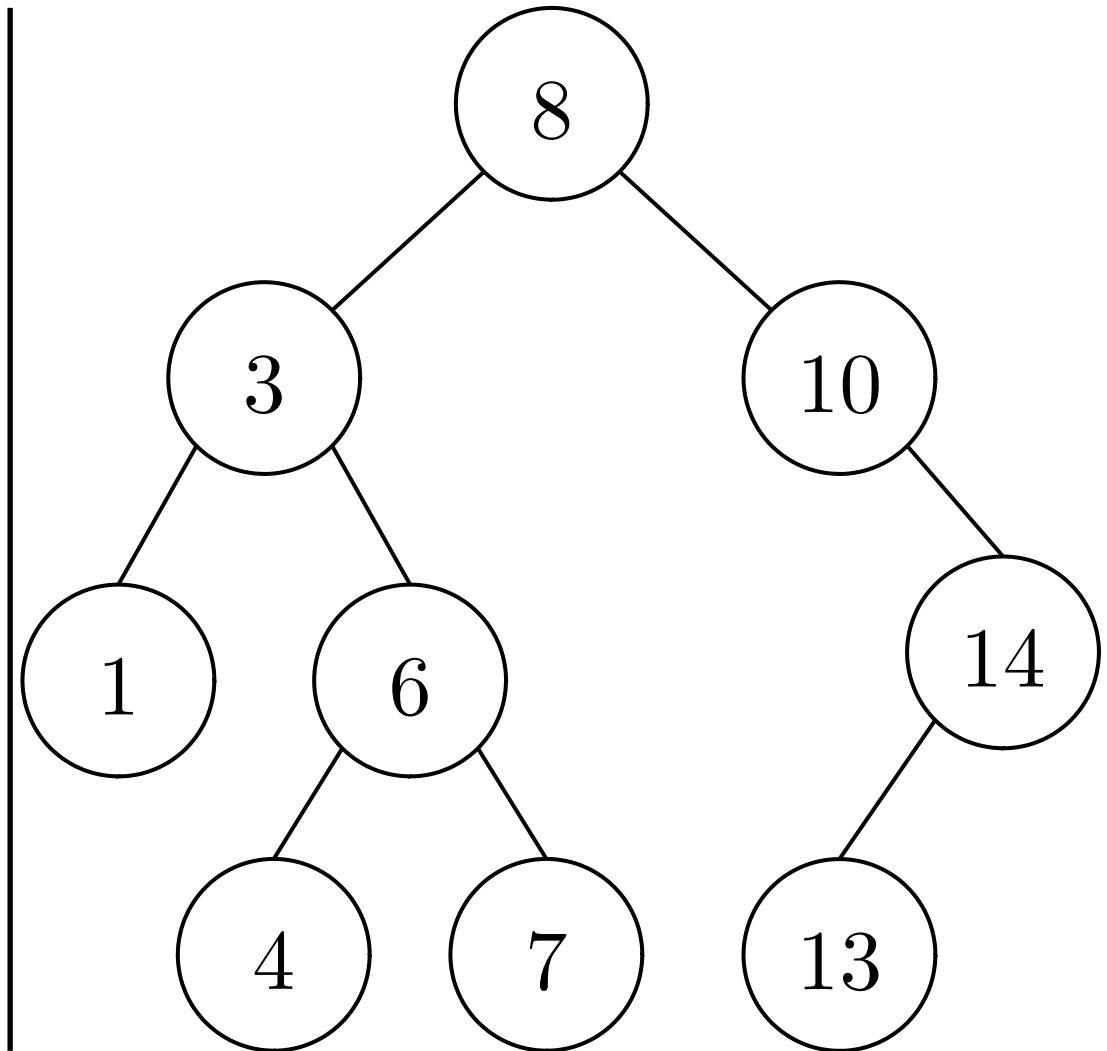
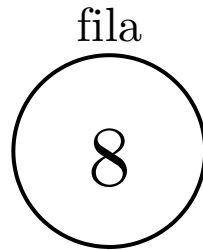
fila

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
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        nó = fila.dequeue()  
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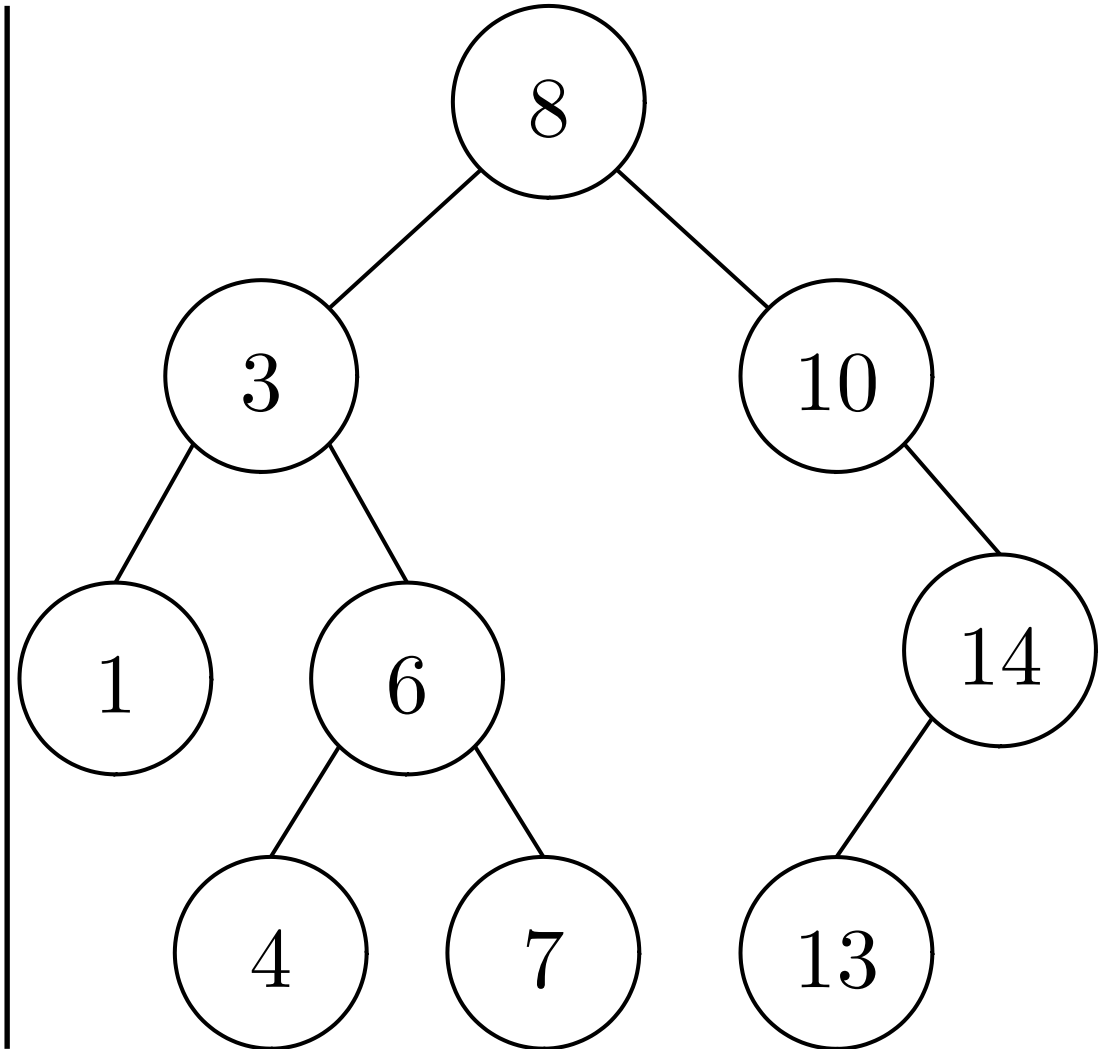
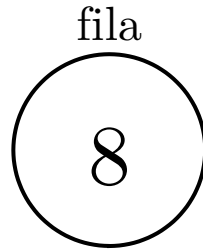
busca em largura

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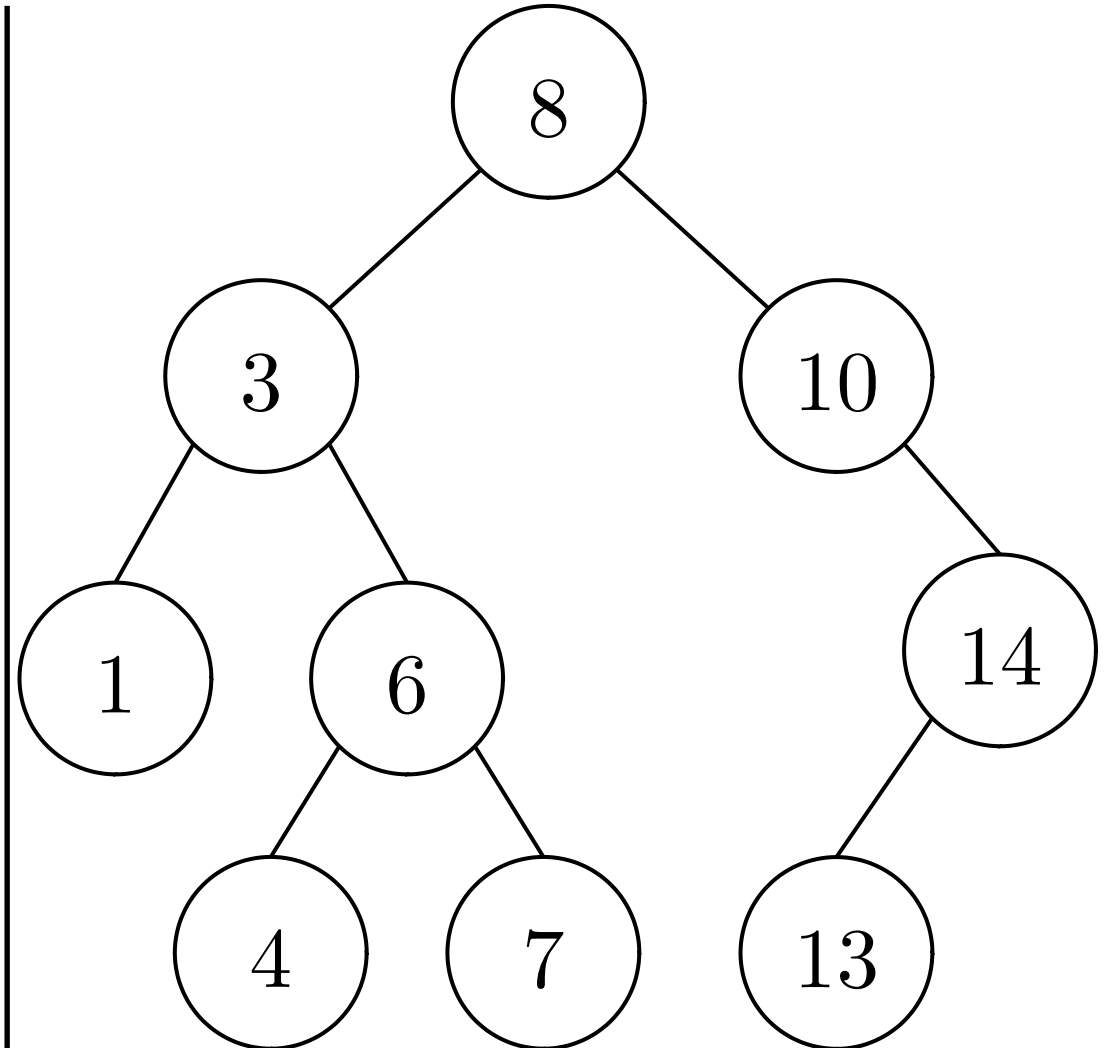
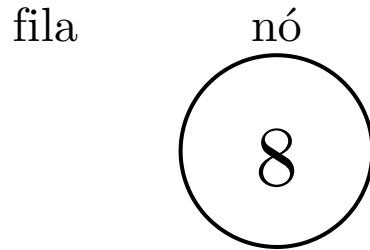
busca em largura

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def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
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busca em largura

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def bfs(nó_inicial):  
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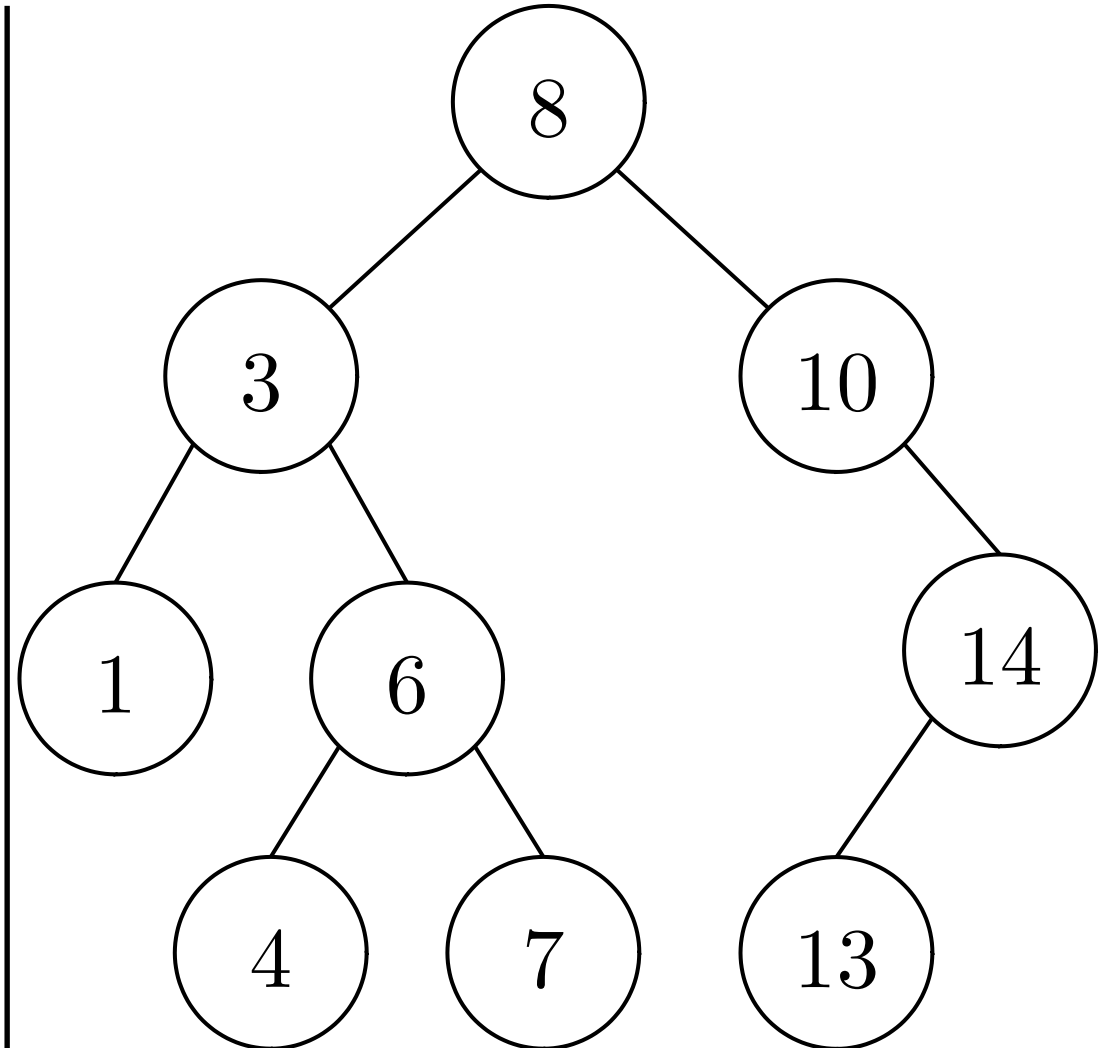
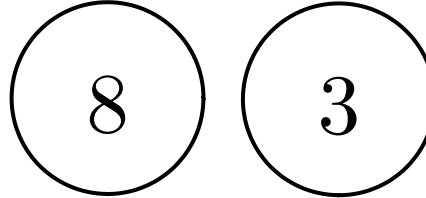
busca em largura

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        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```

fila

nó

filho



busca em largura

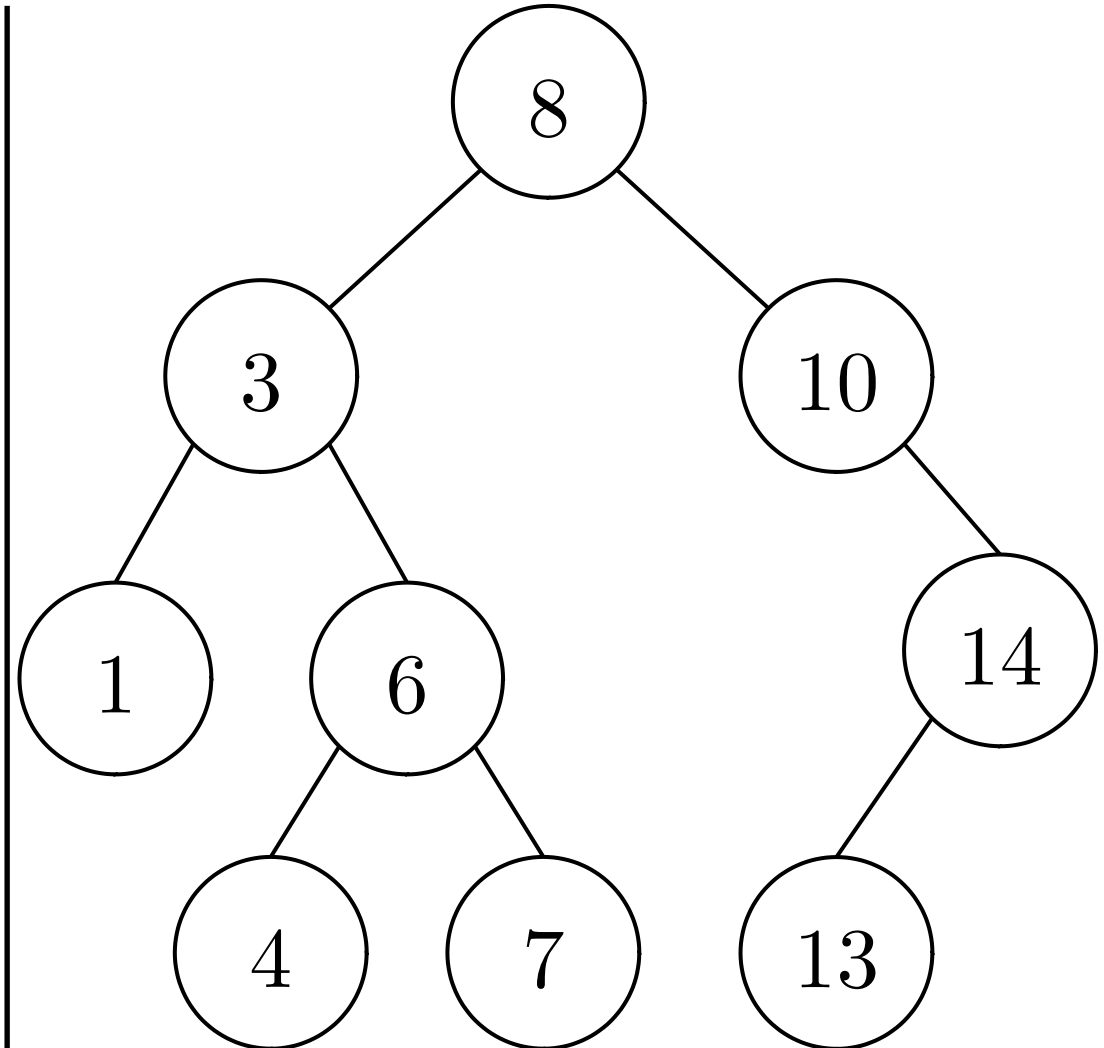
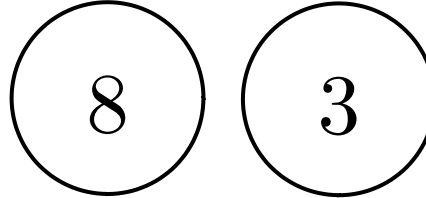
➡

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fila

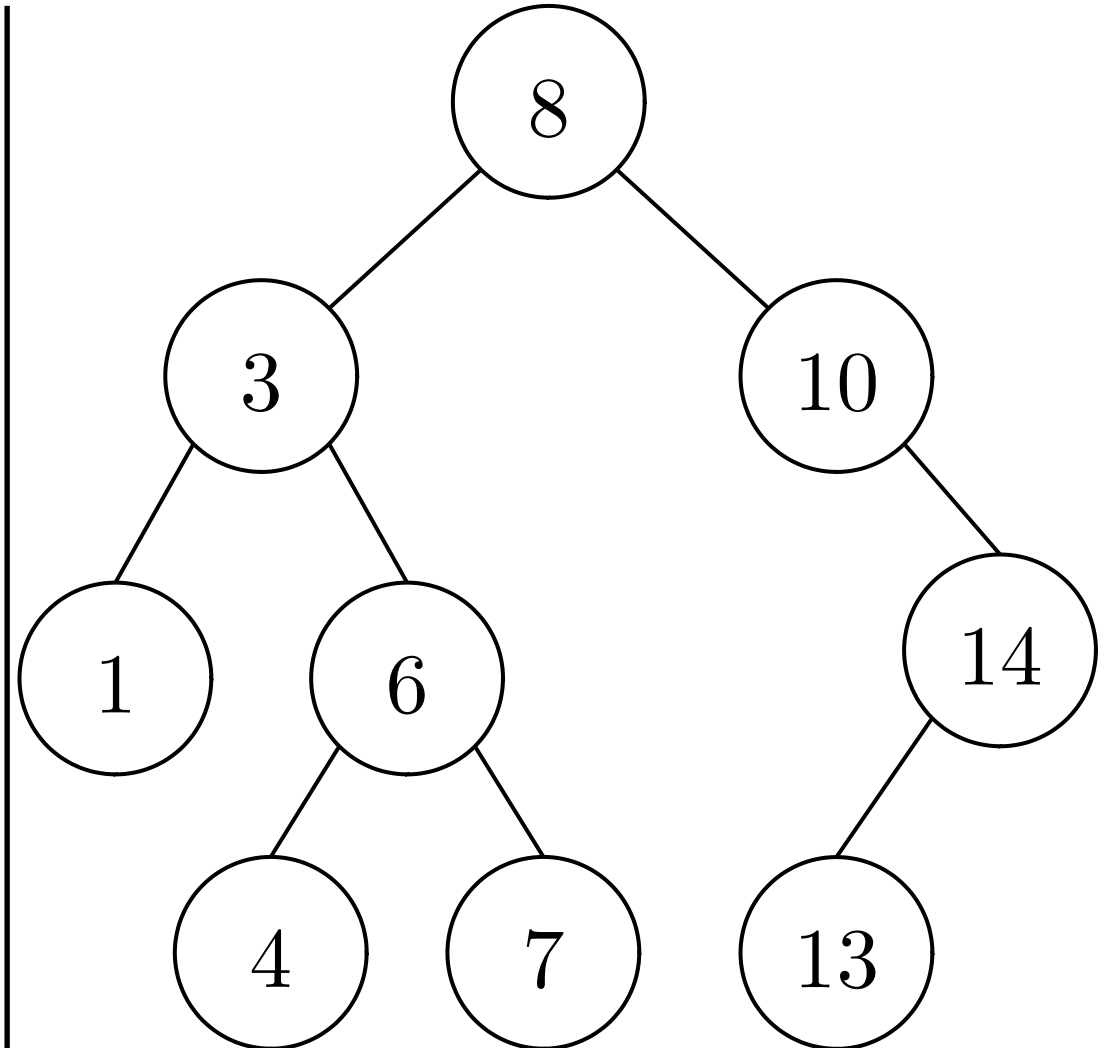
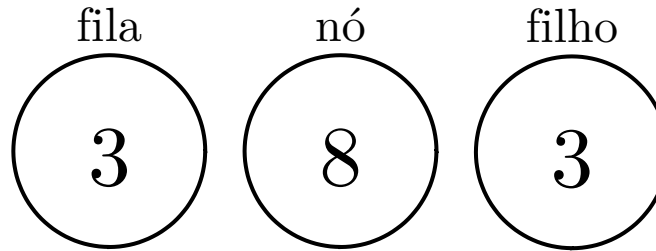
nó

filho



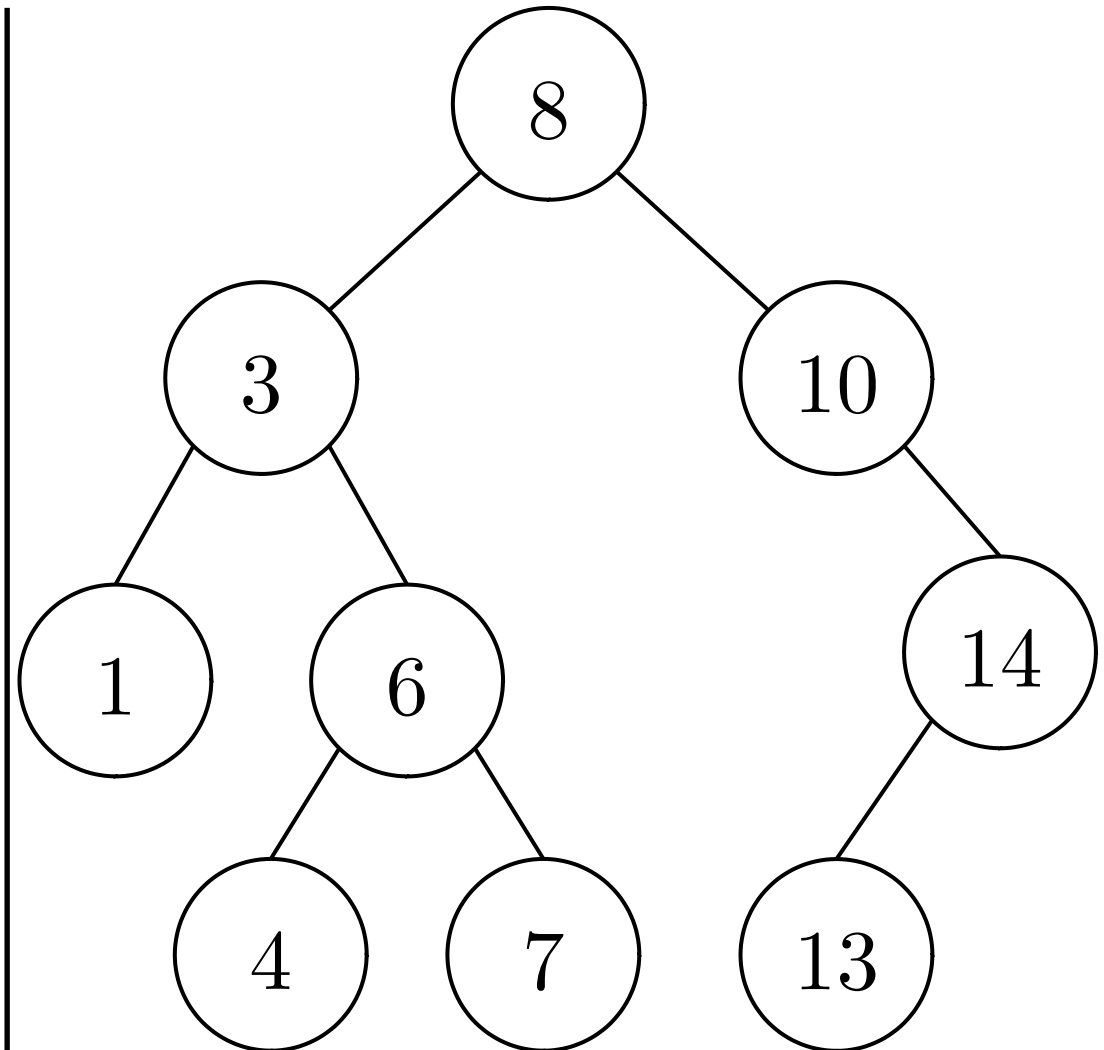
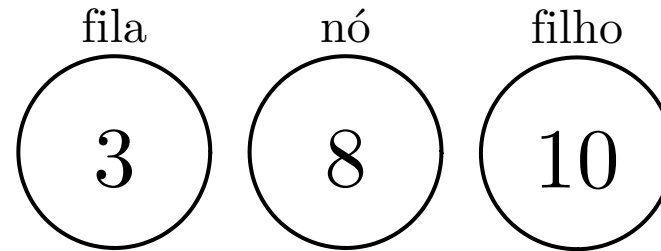
busca em largura

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def bfs(nó_inicial):  
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    fila.enqueue(nó_inicial)  
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busca em largura

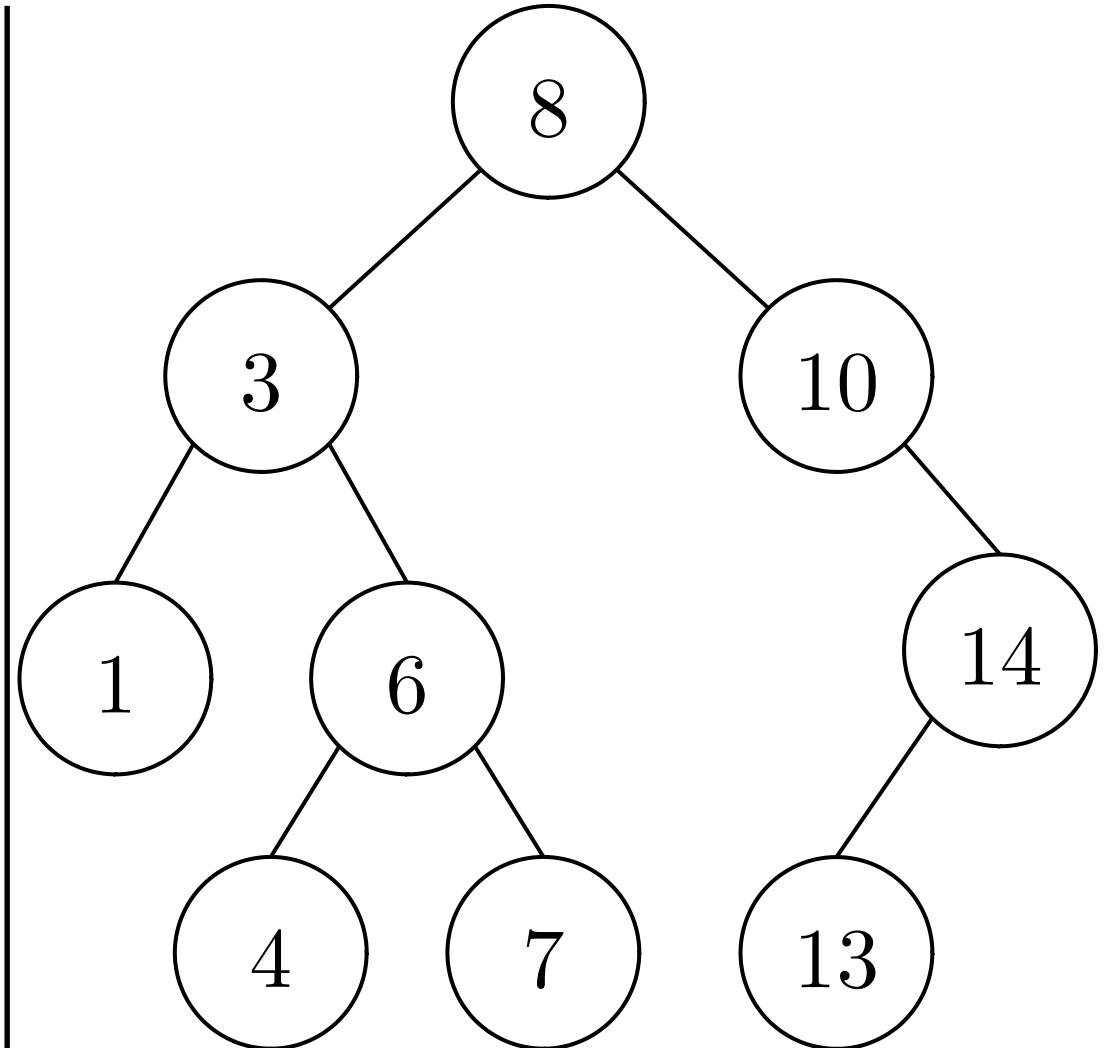
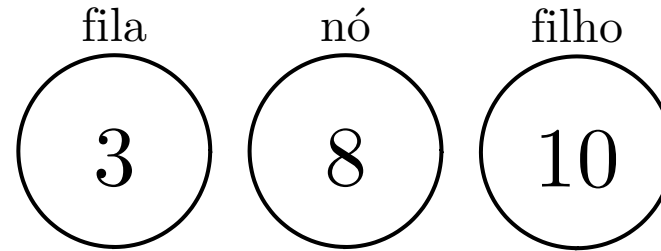
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busca em largura

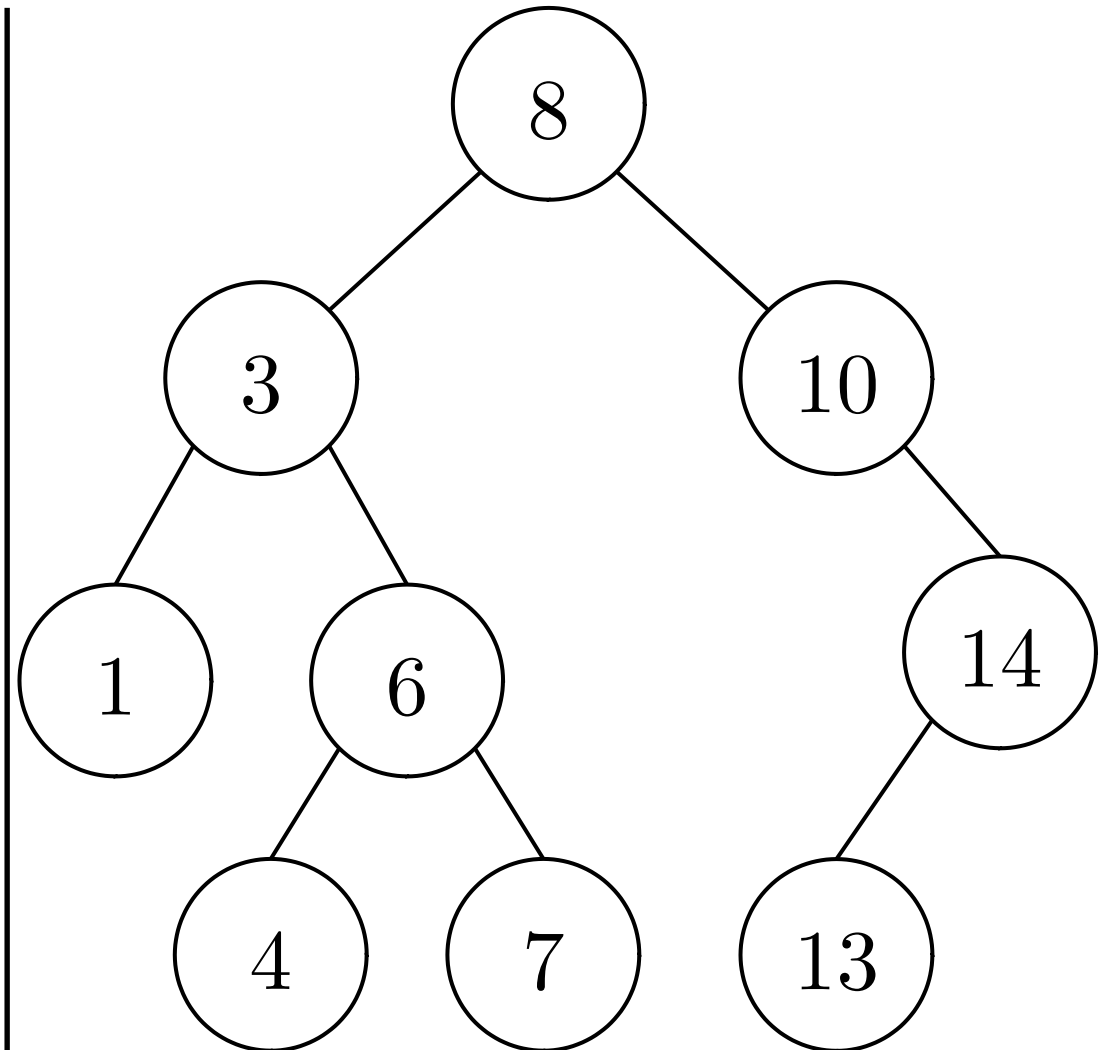
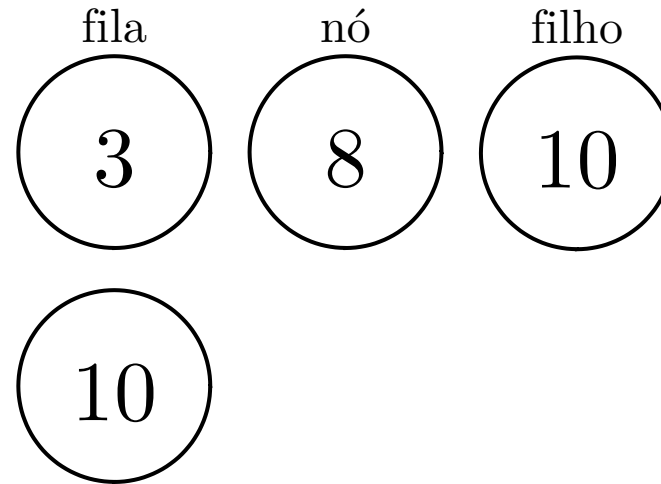
➡

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busca em largura

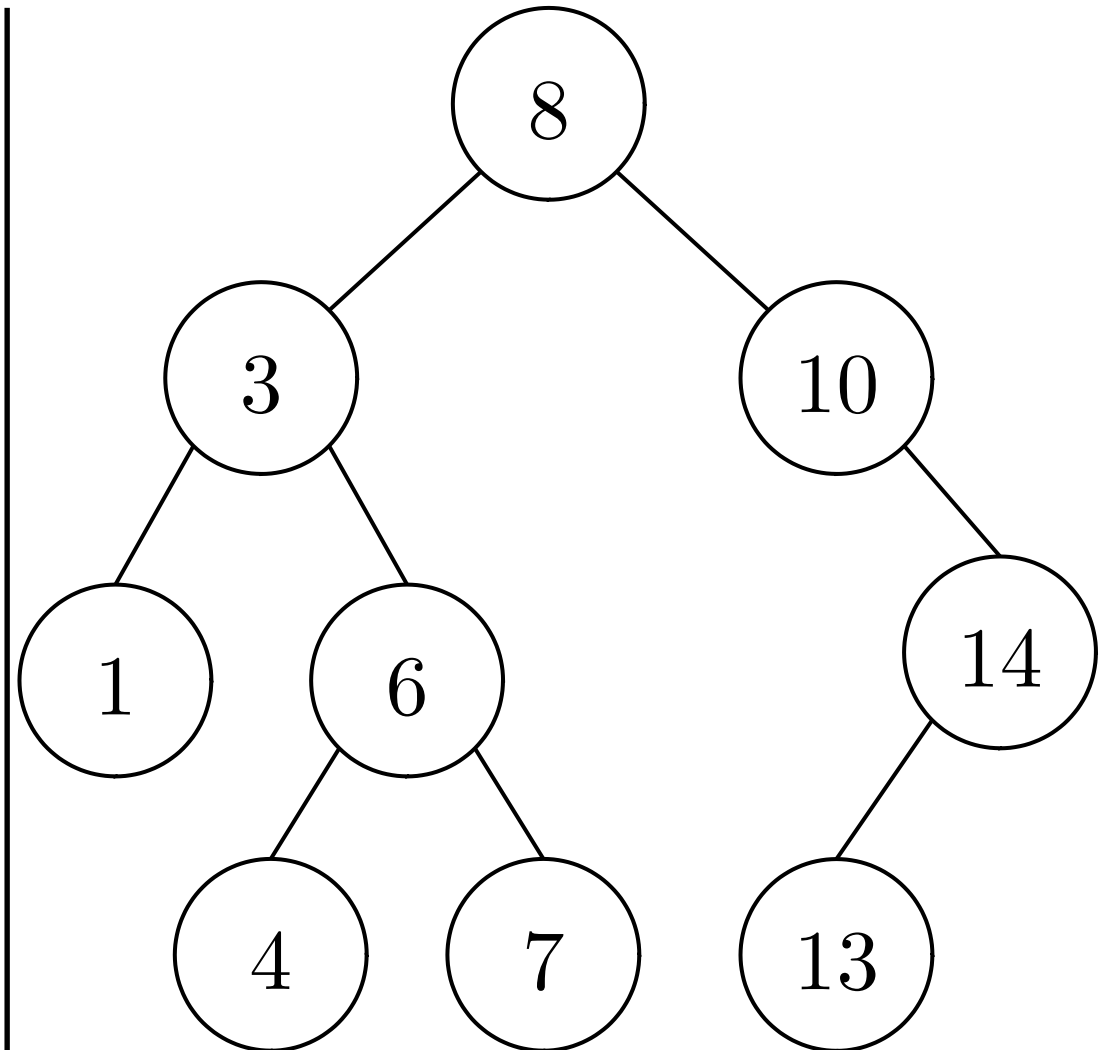
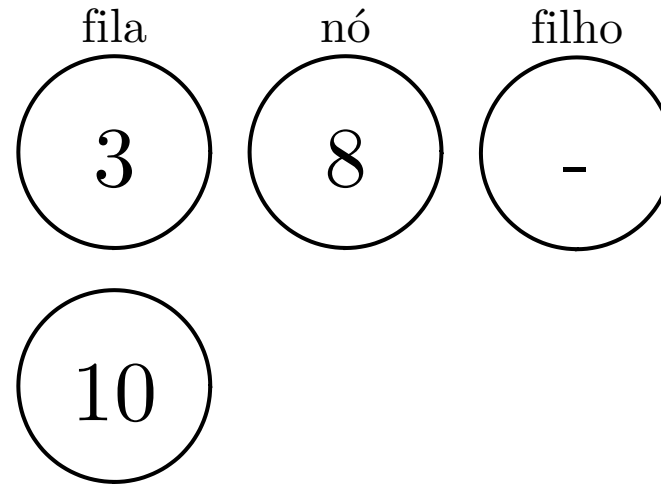
def bfs(nó_inicial):
 fila = Fila()
 fila.enqueue(nó_inicial)
 while (not fila.is_empty()):
 nó = fila.dequeue()
 for filho in nó.children():
 if (not filho.visited):
 fila.enqueue(filho)
 nó.visited = True



busca em largura

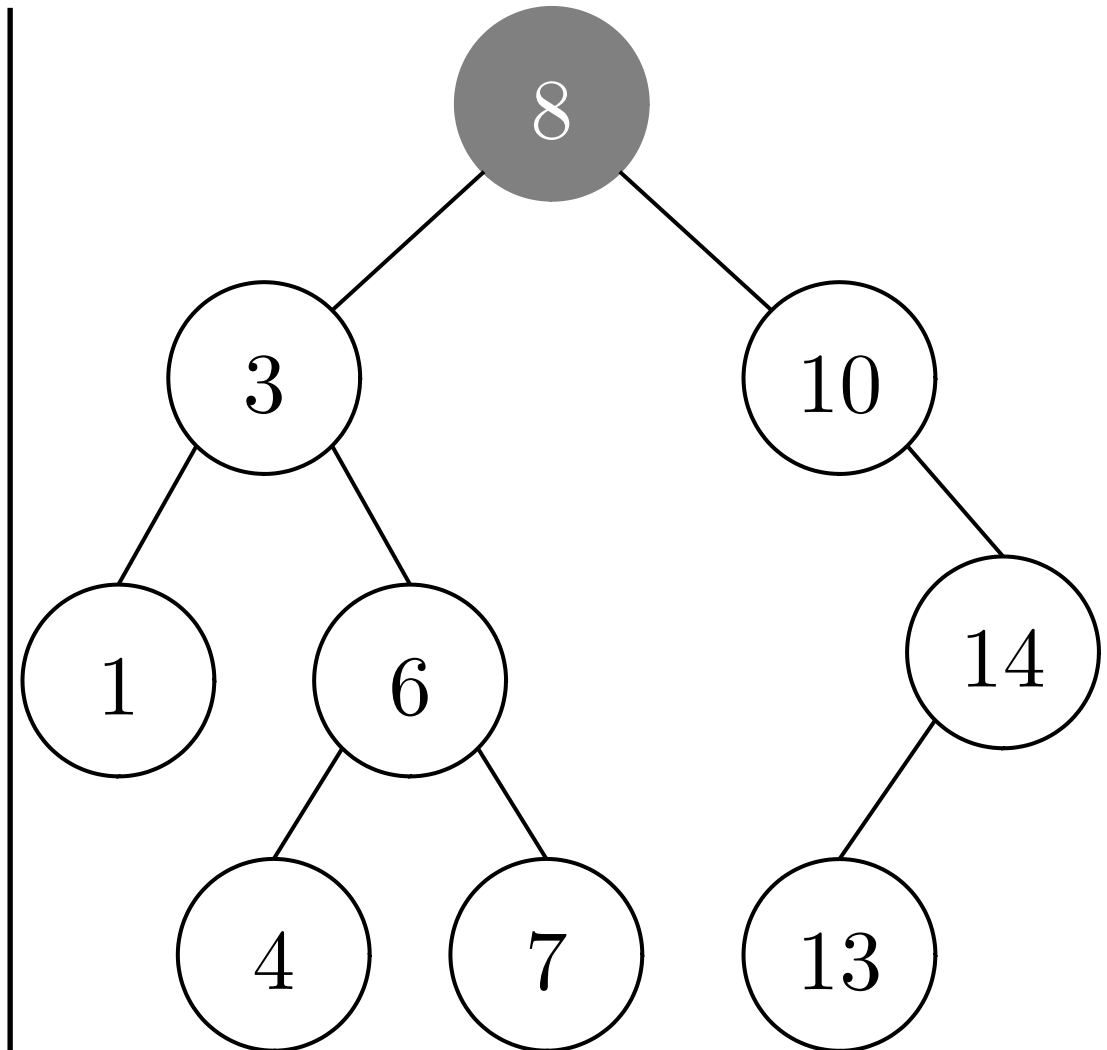
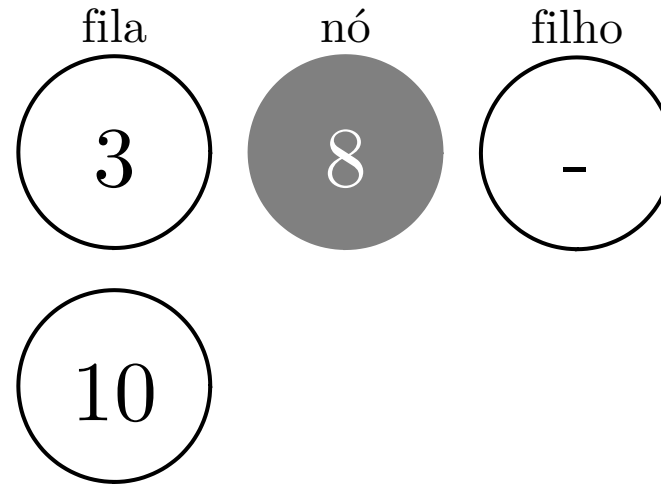
➔

```
def bfs(nó_inicial):  
    fila = Fila()  
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busca em largura

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```



busca em largura

def bfs(nó_inicial):

fila = Fila()

fila.enqueue(nó_inicial)

while (not fila.is_empty()):

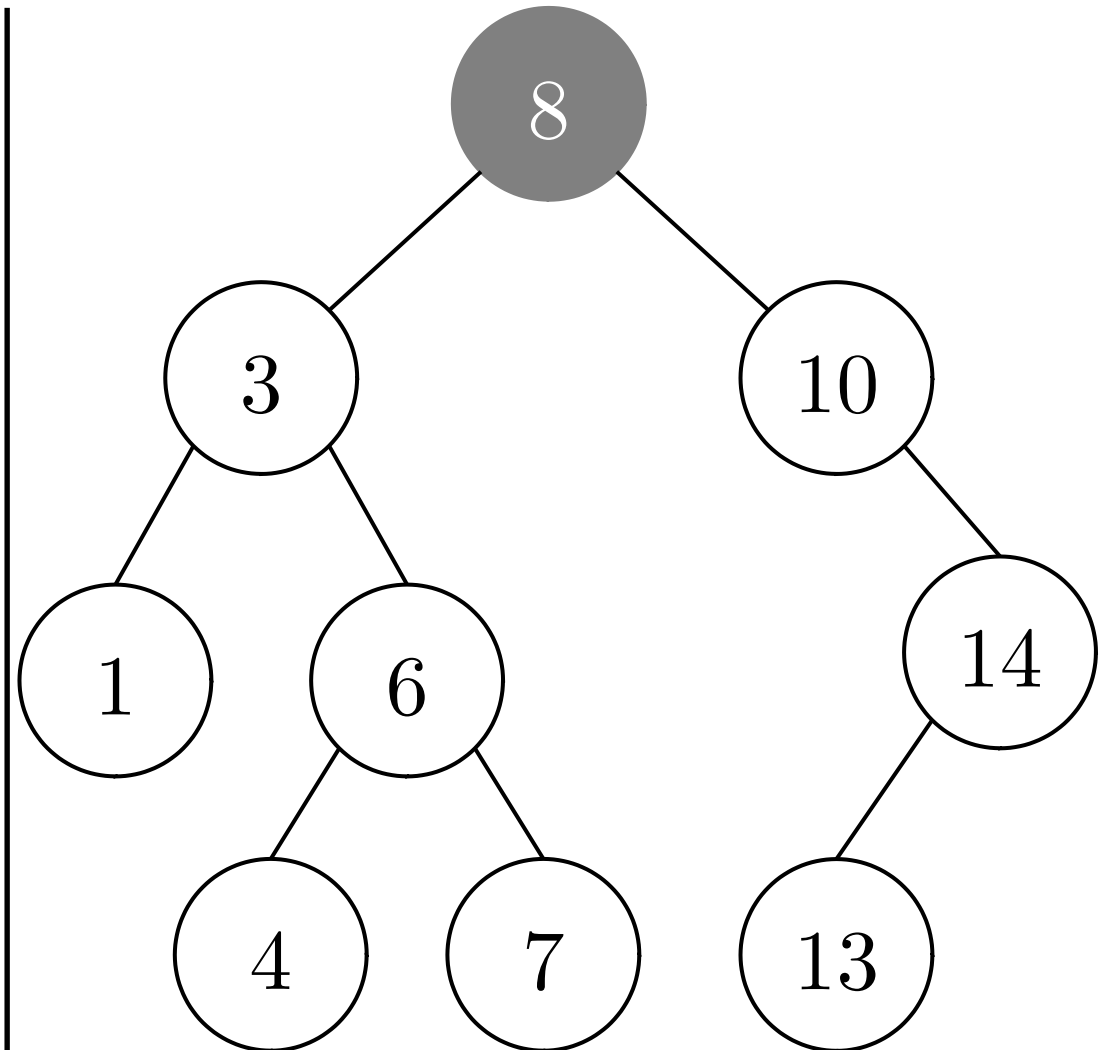
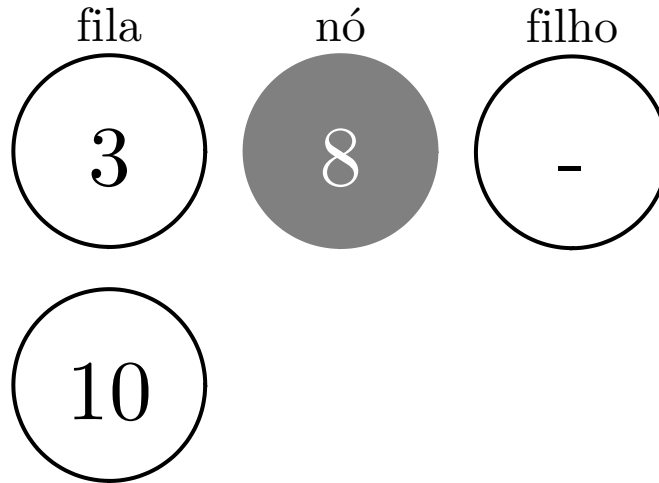
nó = fila.dequeue()

for filho in nó.children():

if (not filho.visited):

fila.enqueue(filho)

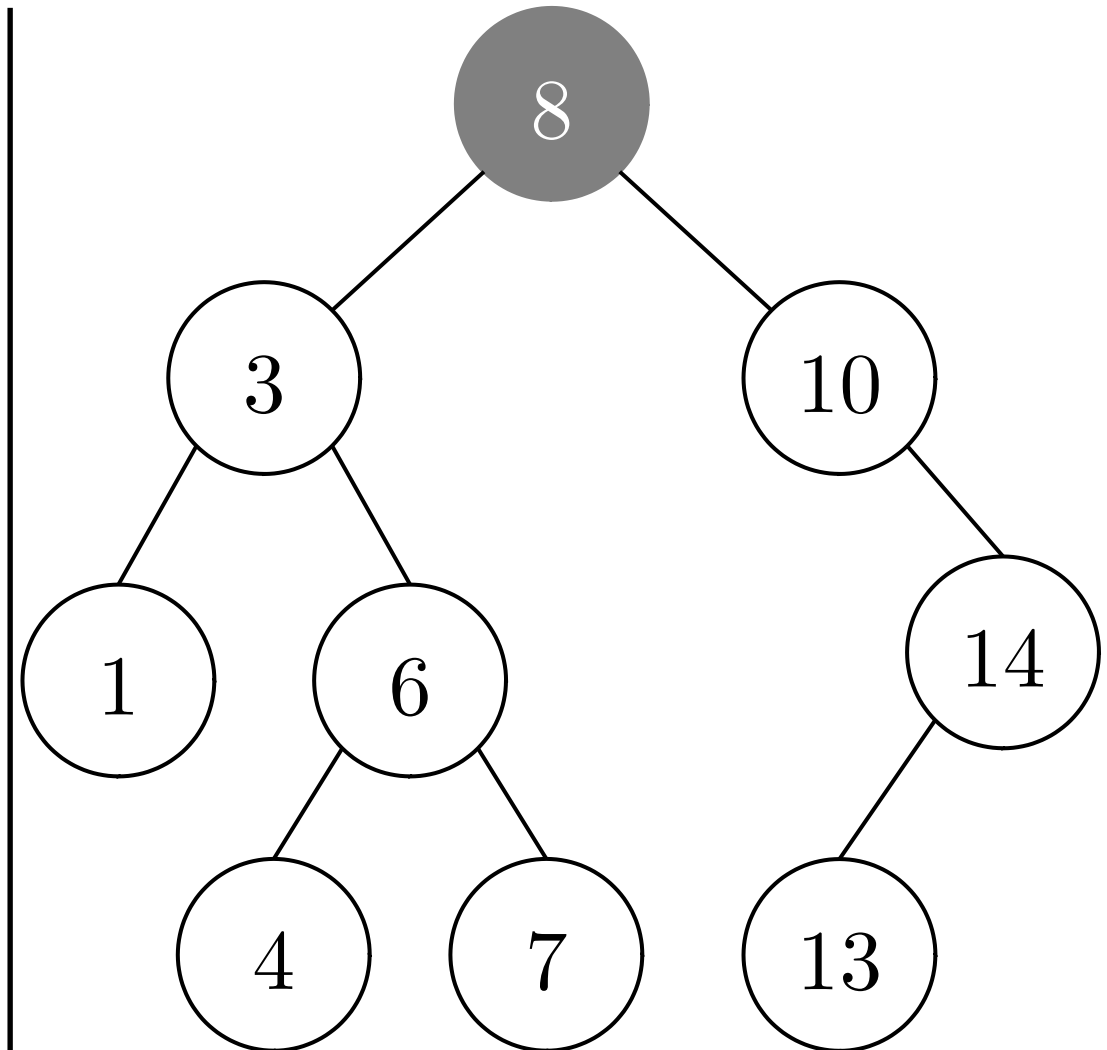
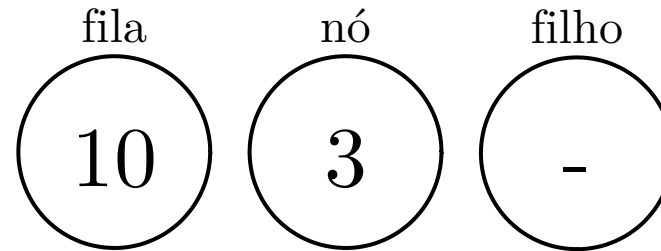
nó.visited = True



busca em largura

➔

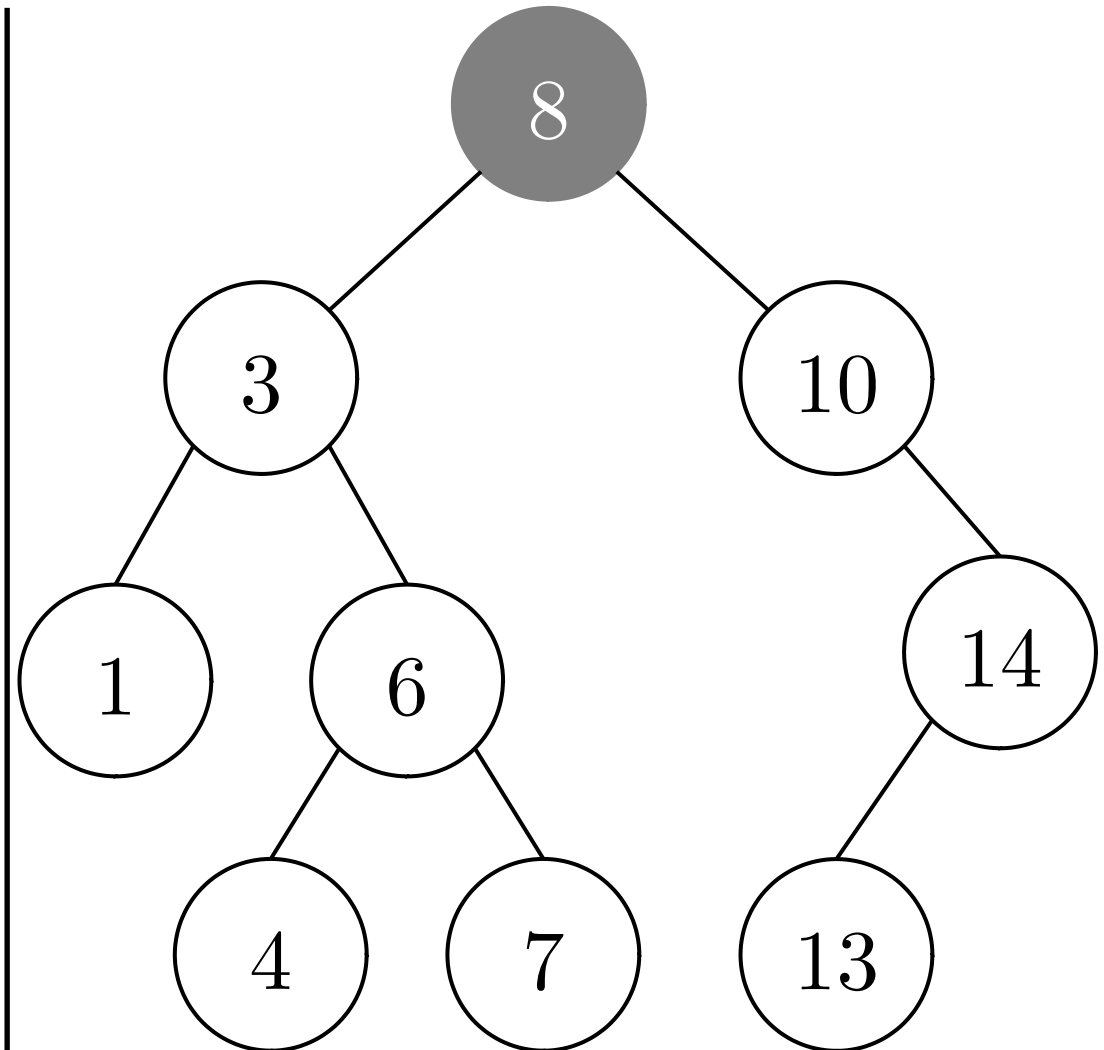
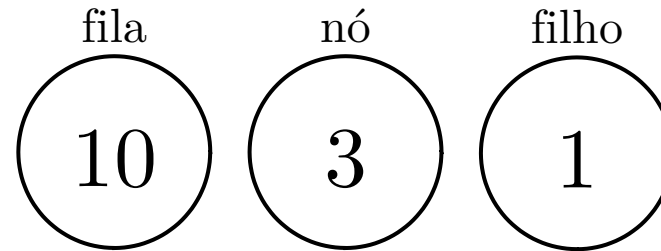
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busca em largura

➔

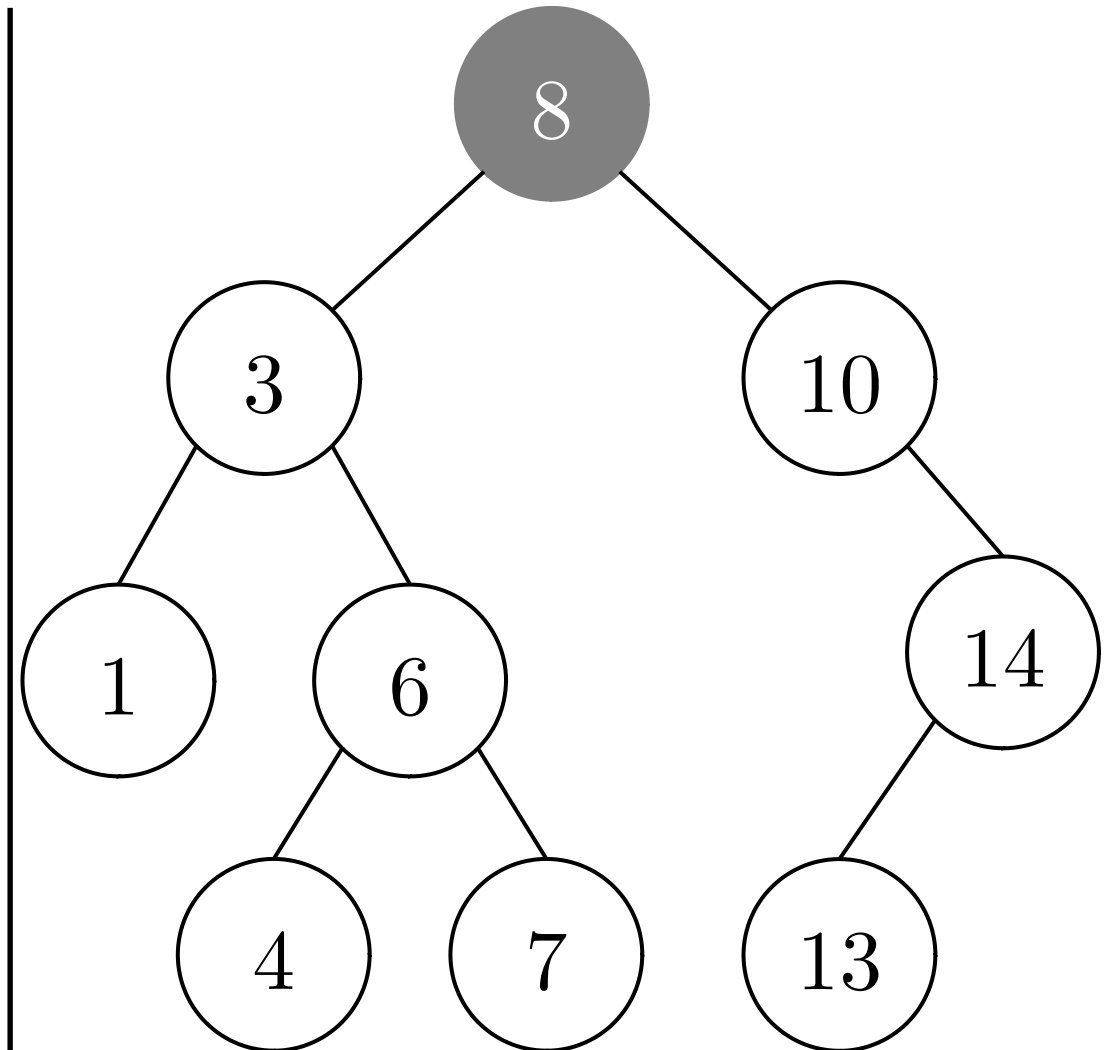
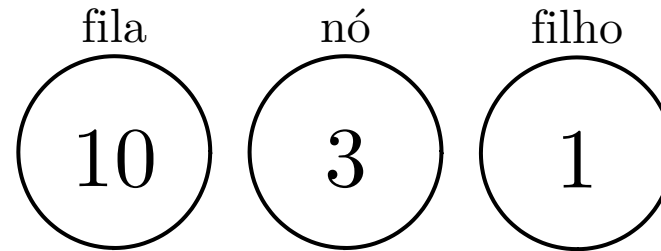
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busca em largura

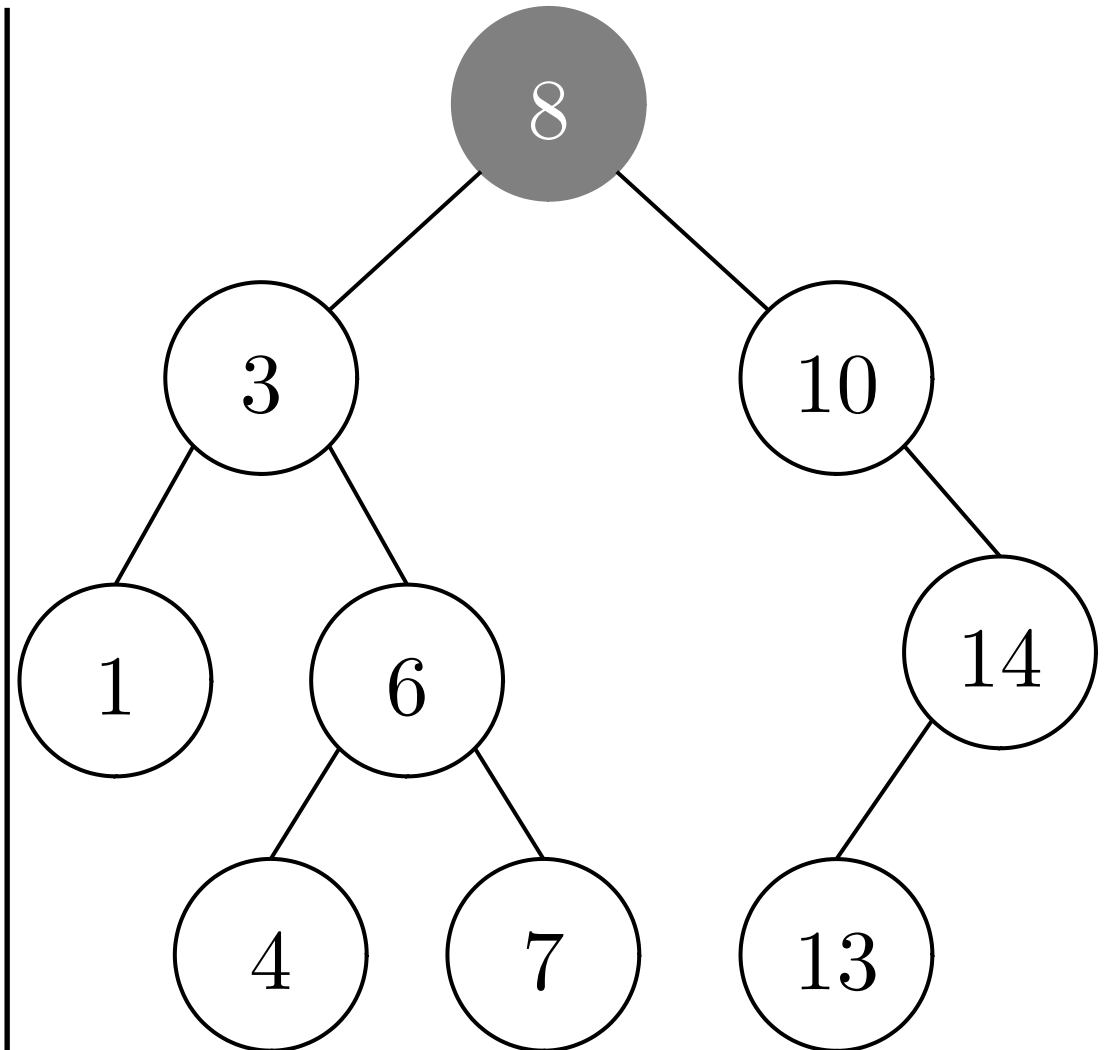
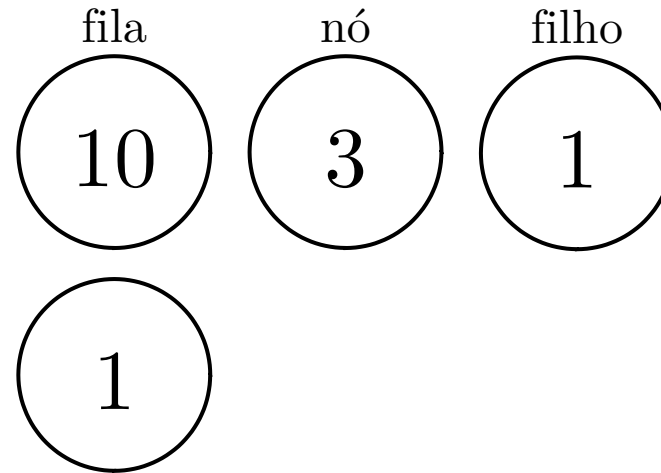
➡

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busca em largura

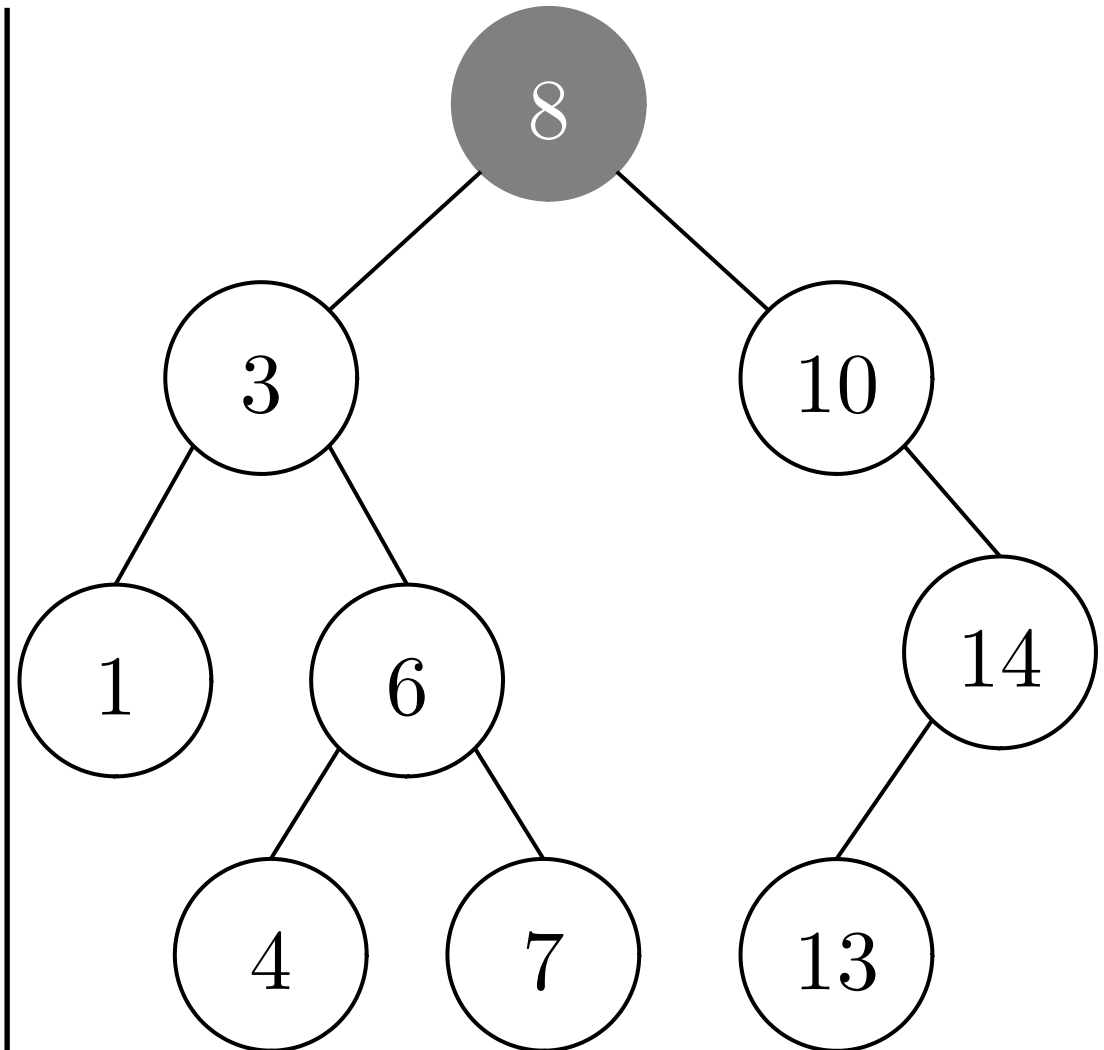
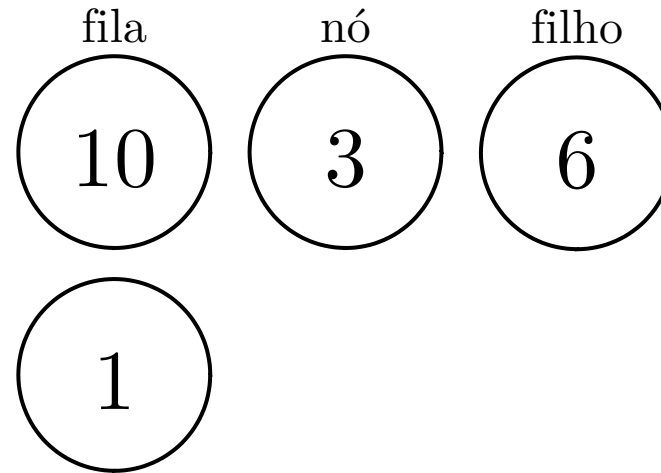
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busca em largura

➔

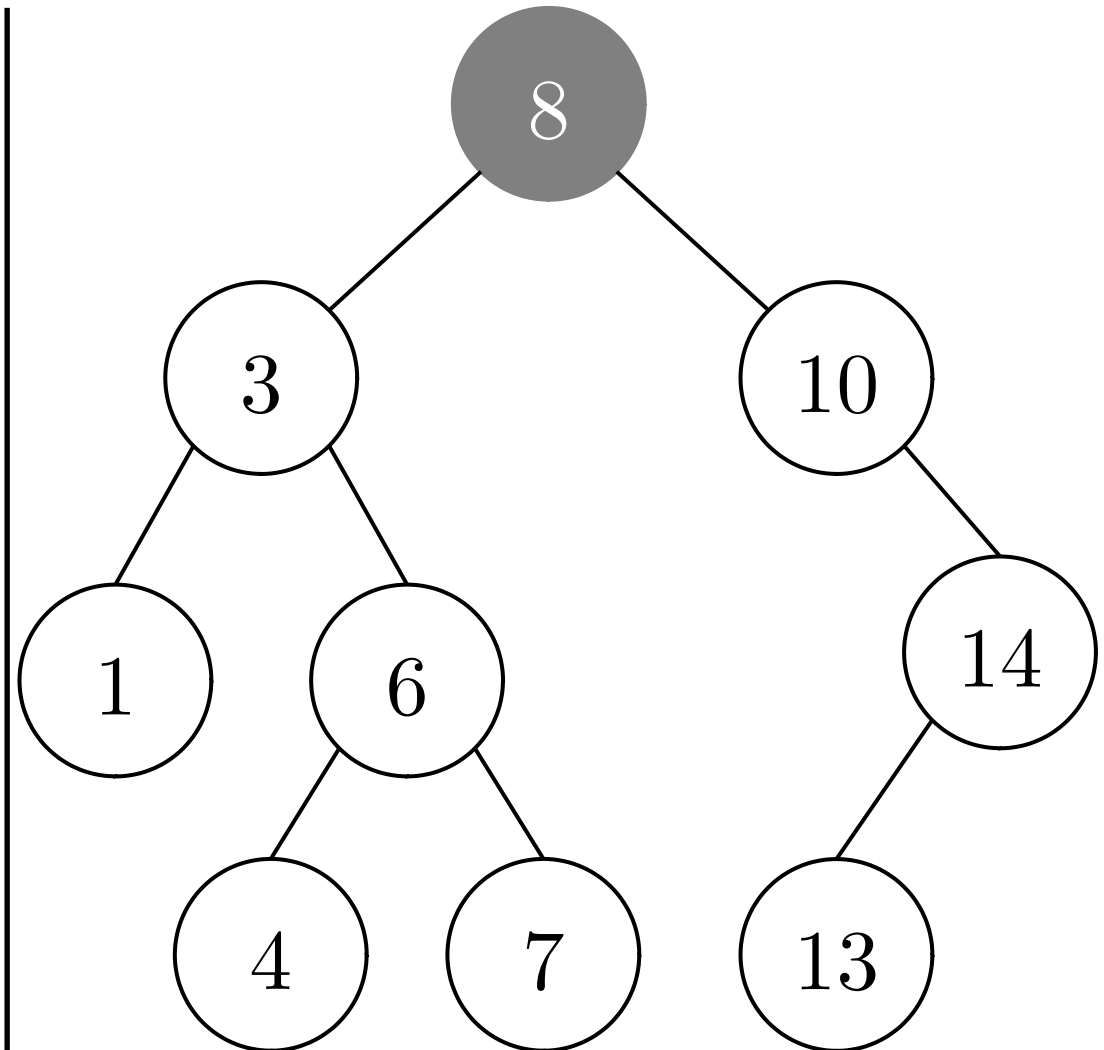
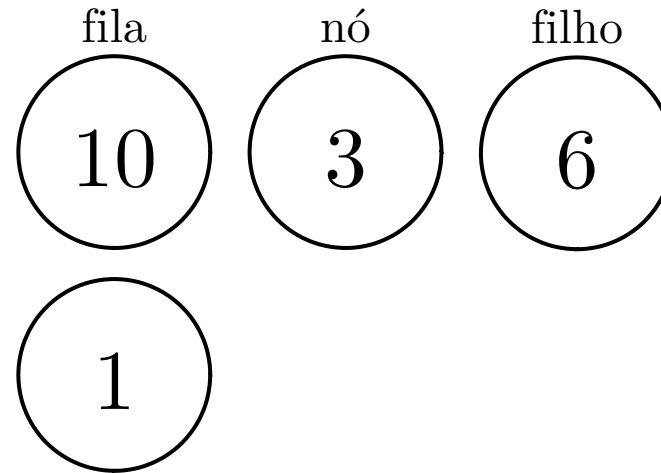
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busca em largura

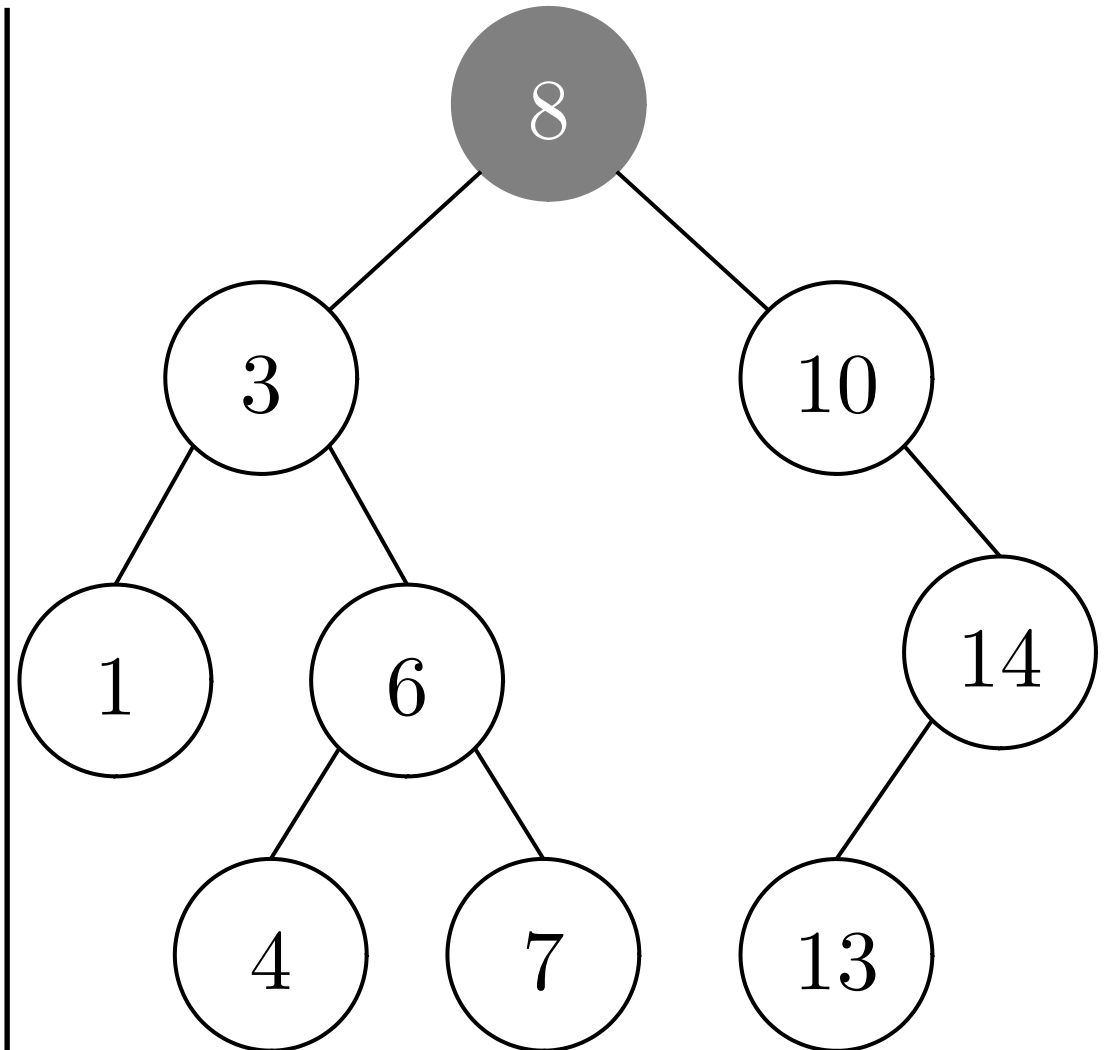
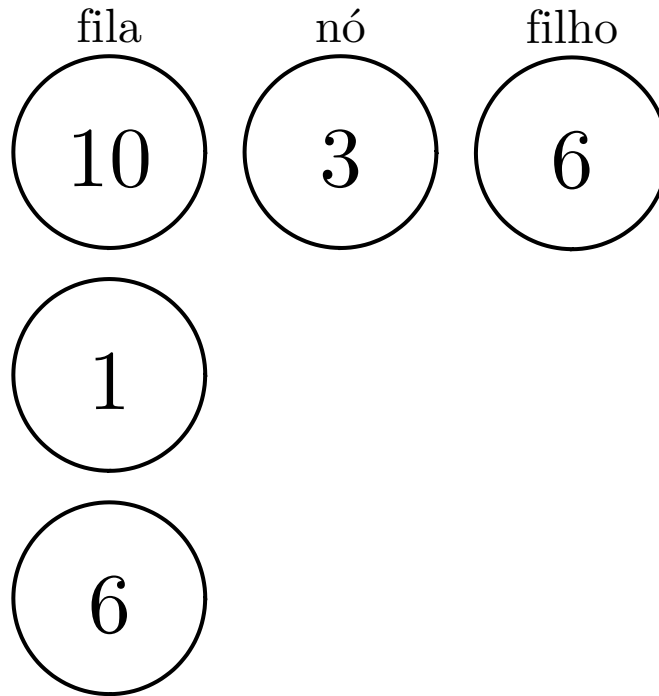
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busca em largura

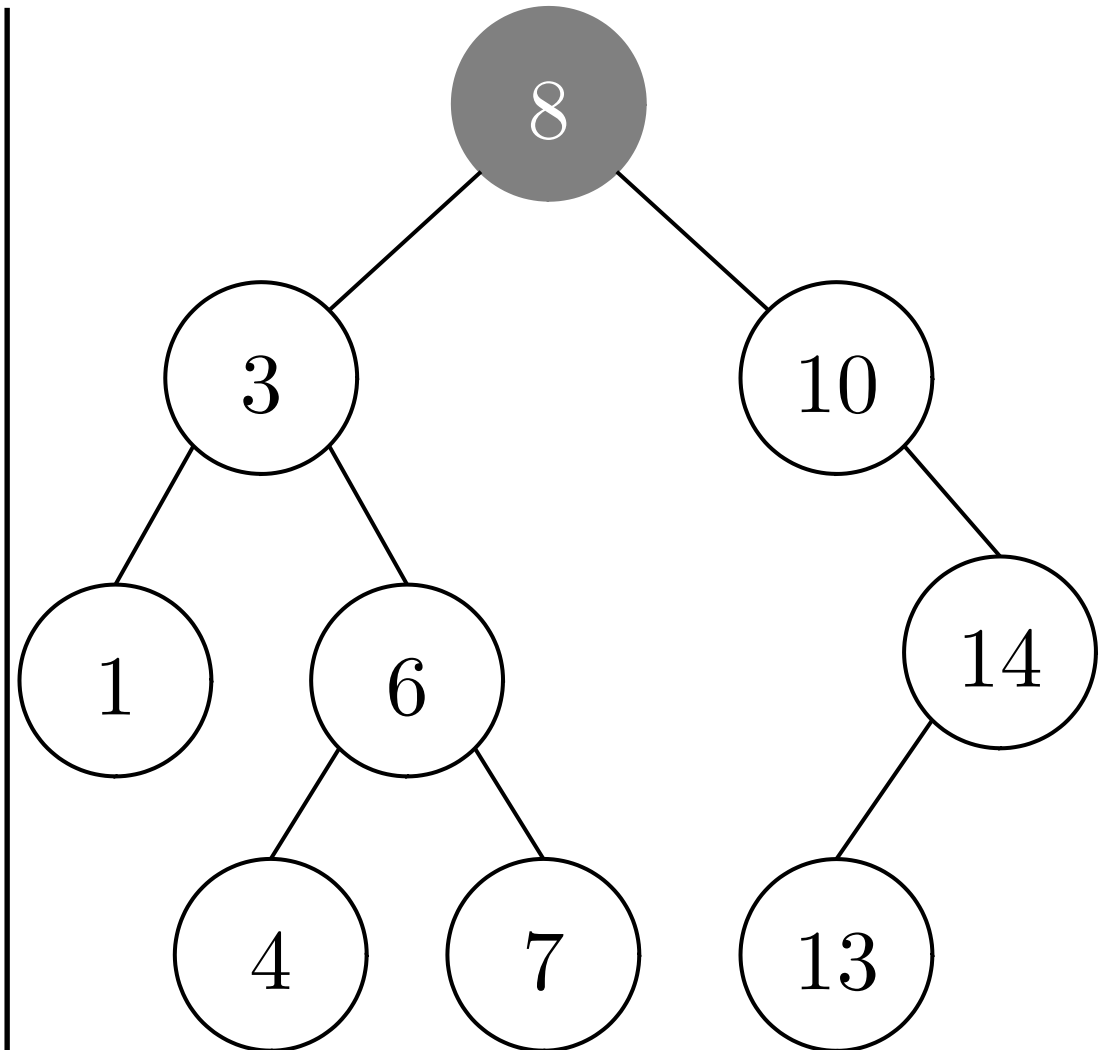
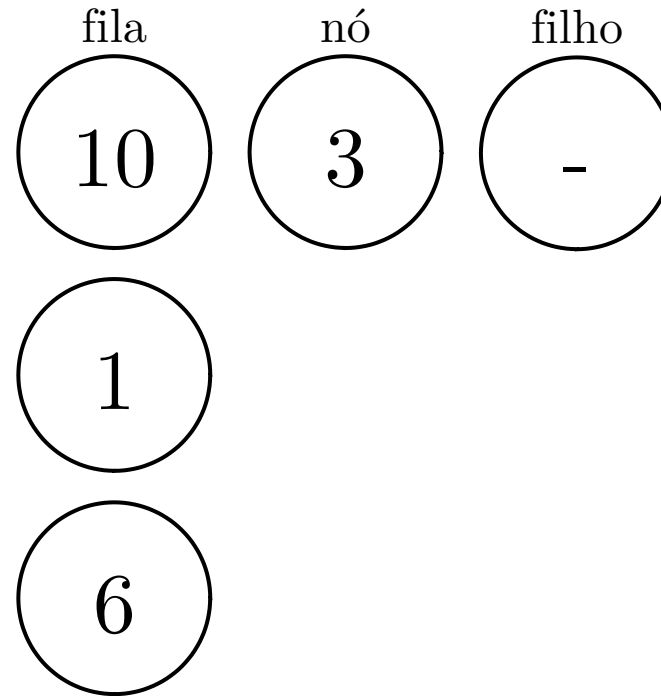
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busca em largura

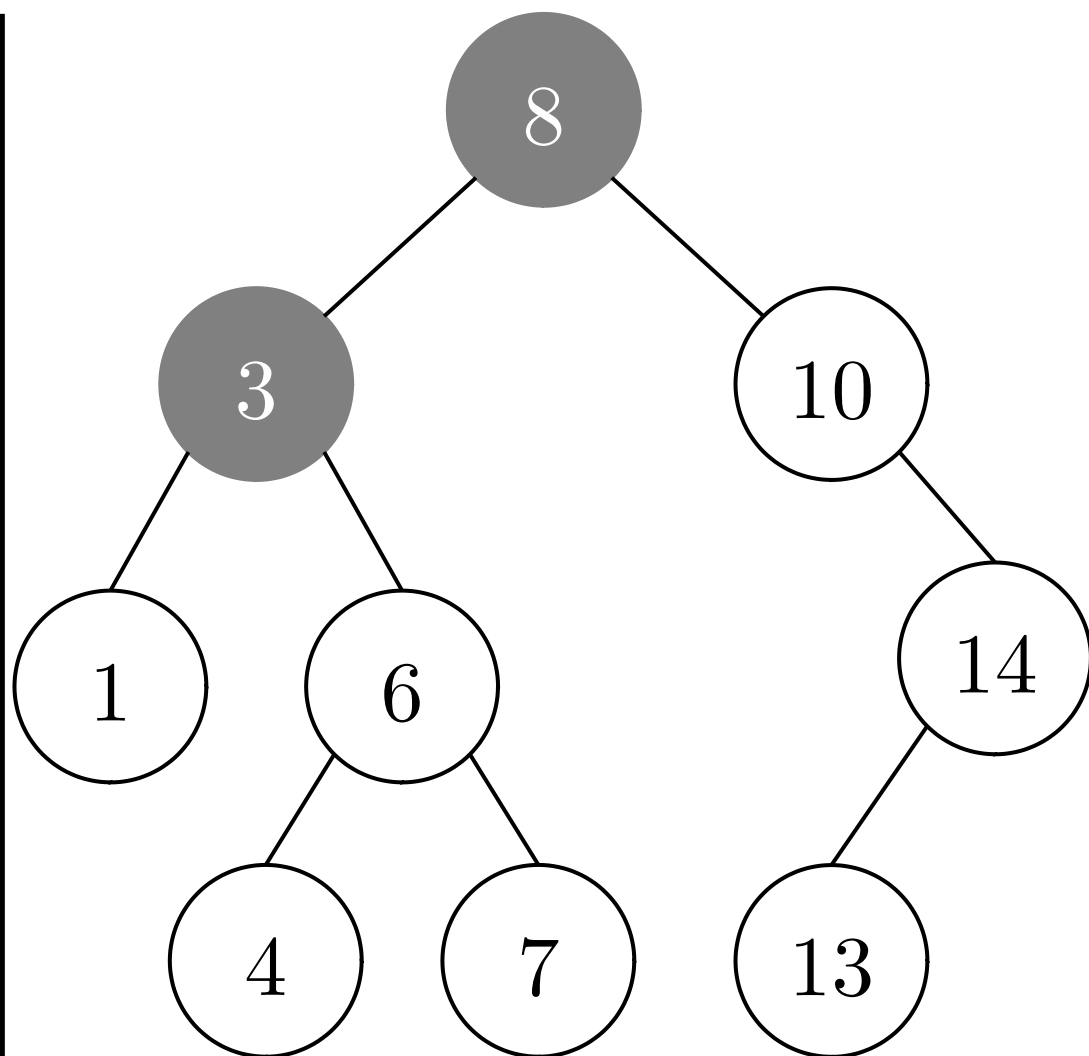
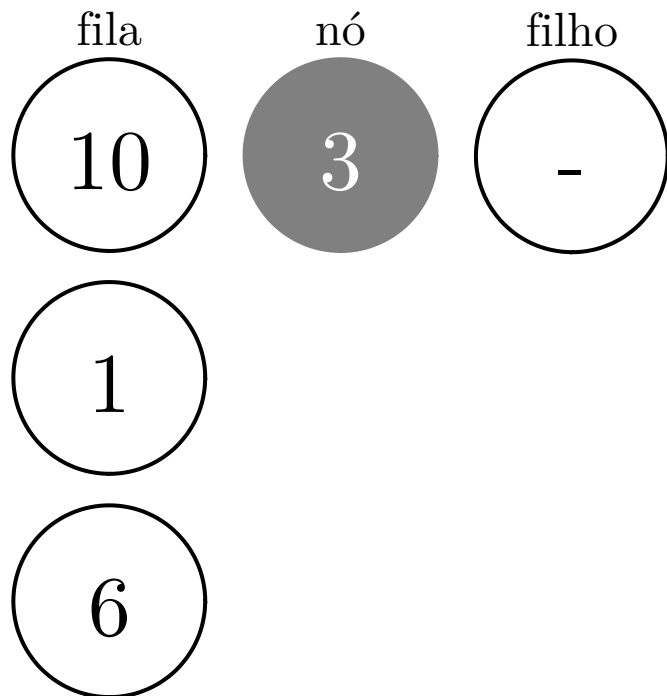
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busca em largura

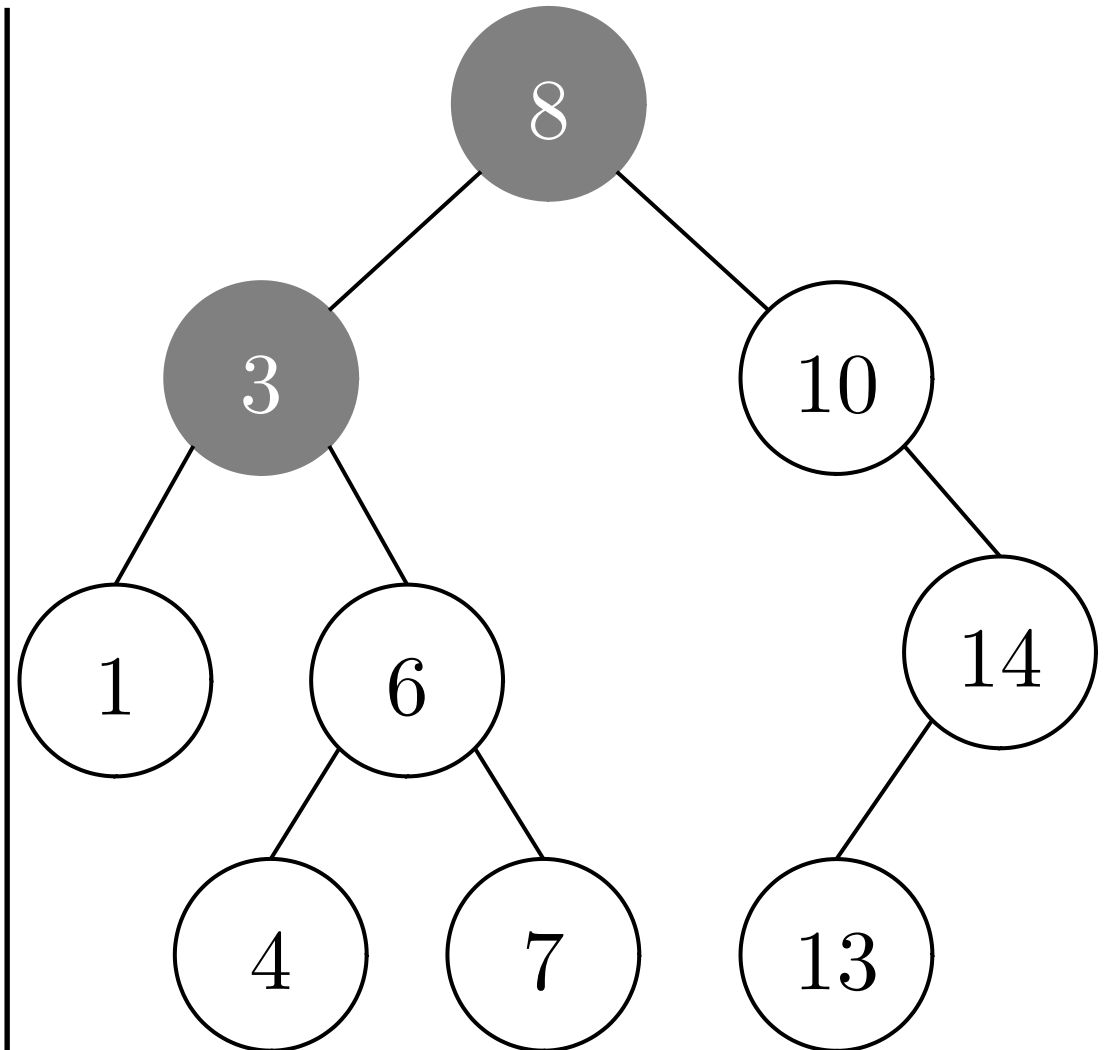
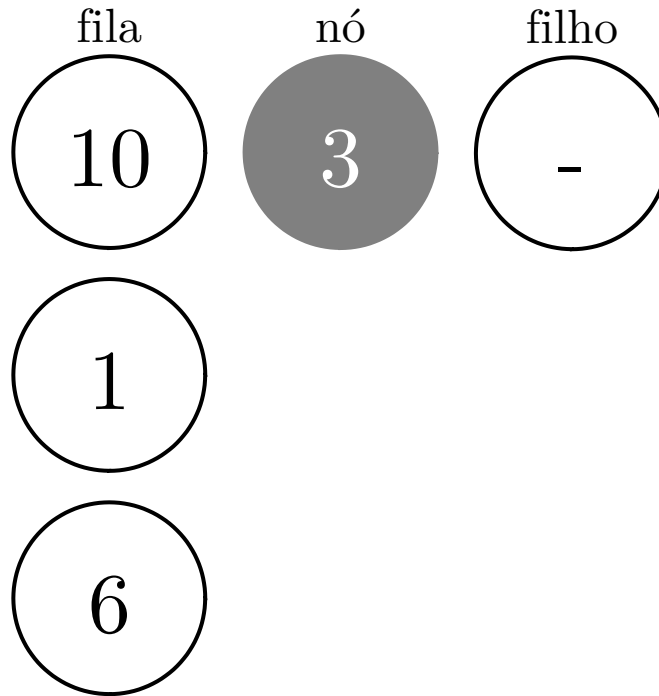
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busca em largura

➔

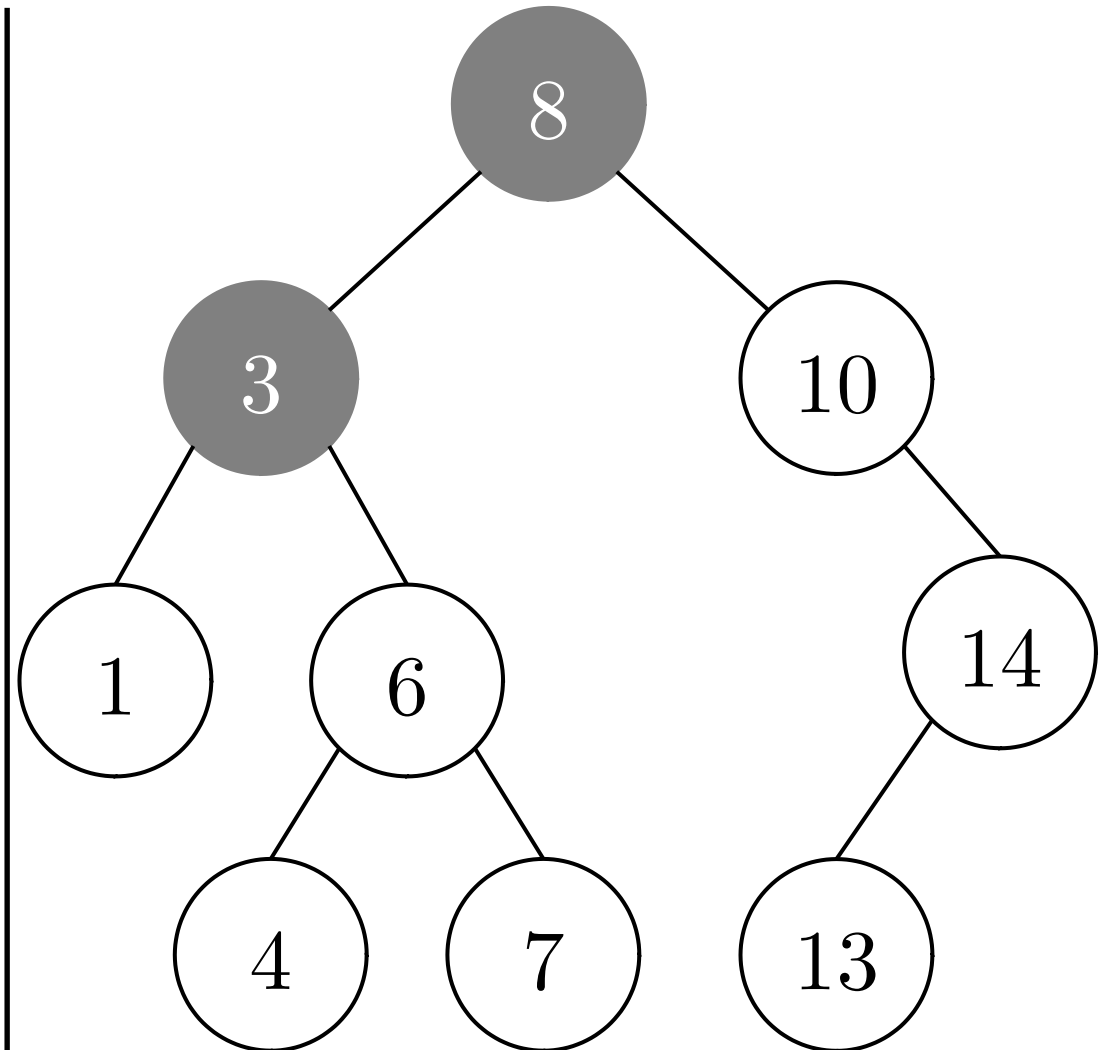
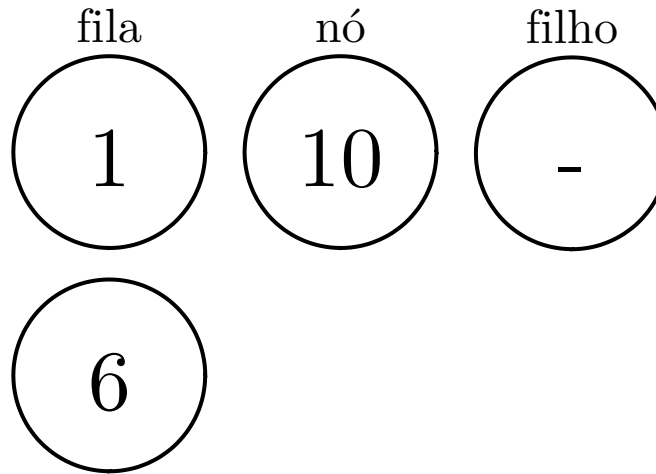
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busca em largura

➔

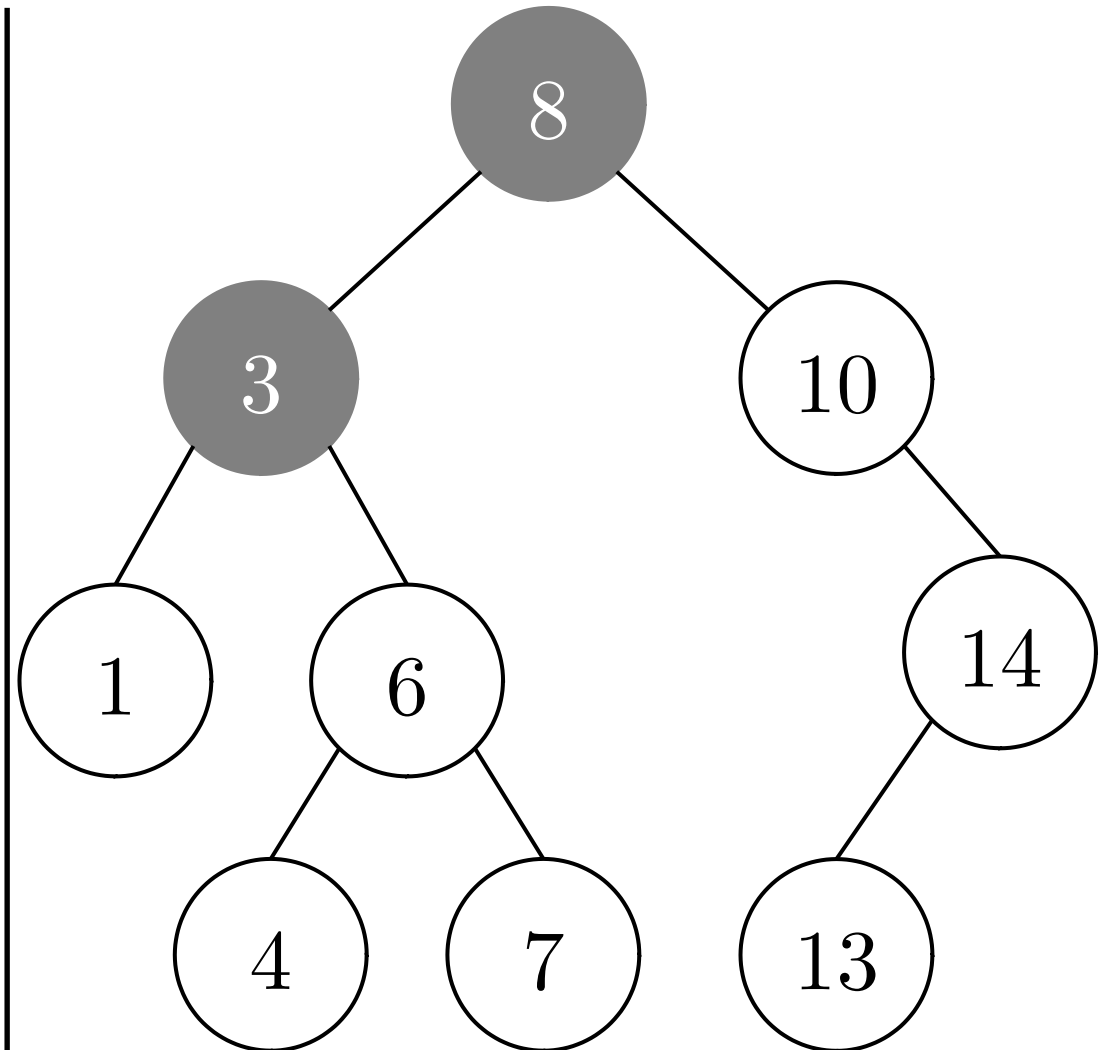
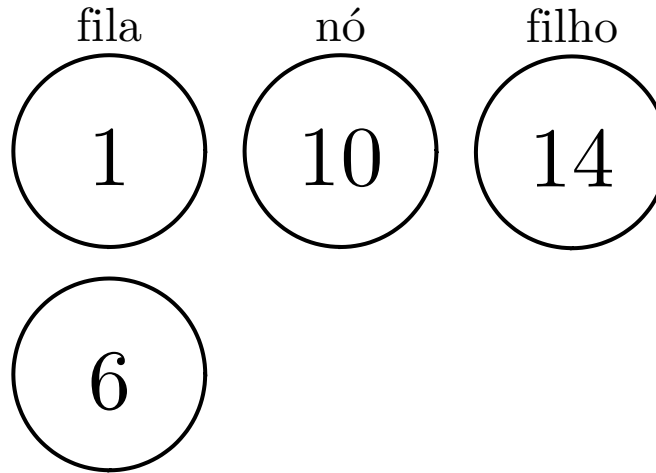
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busca em largura

➔

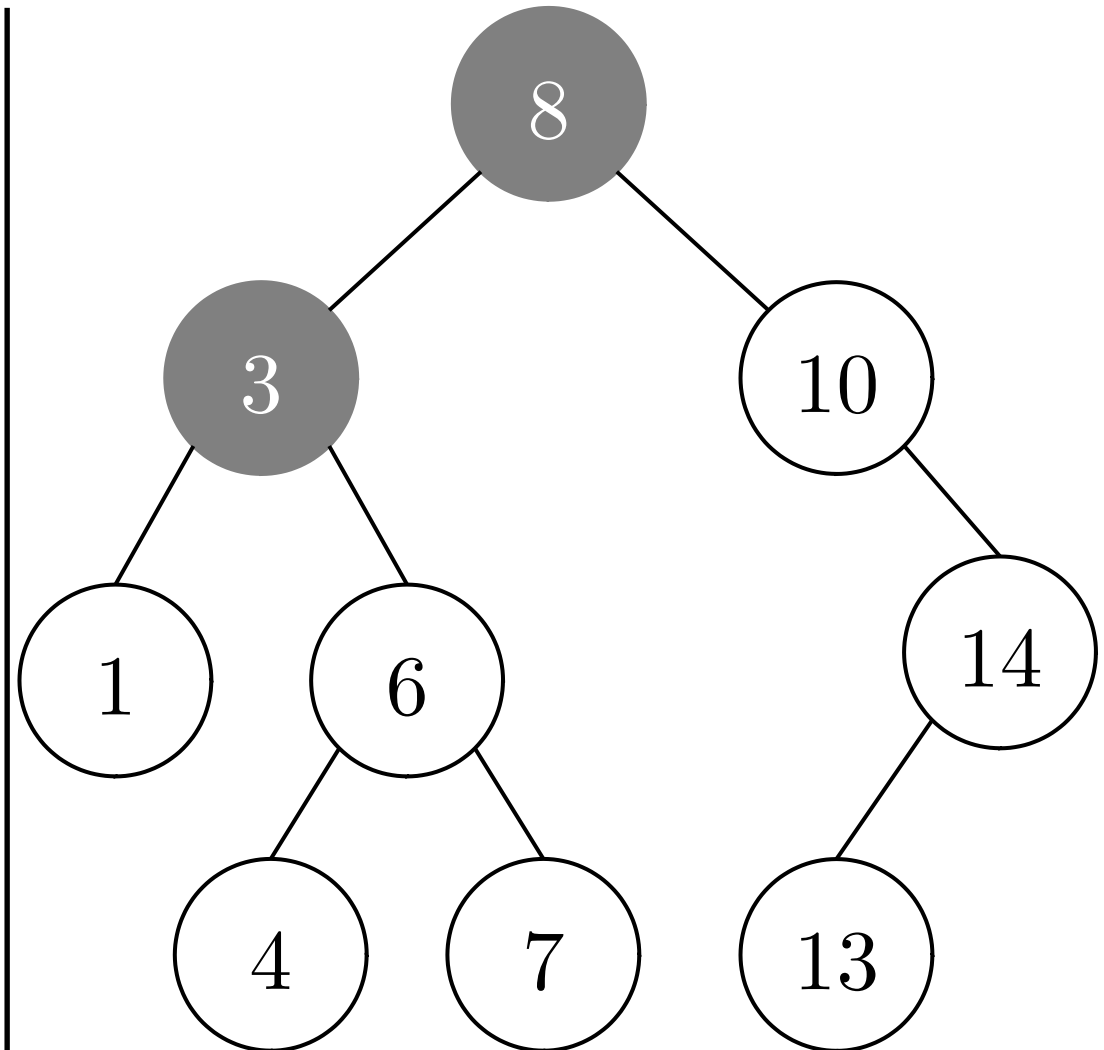
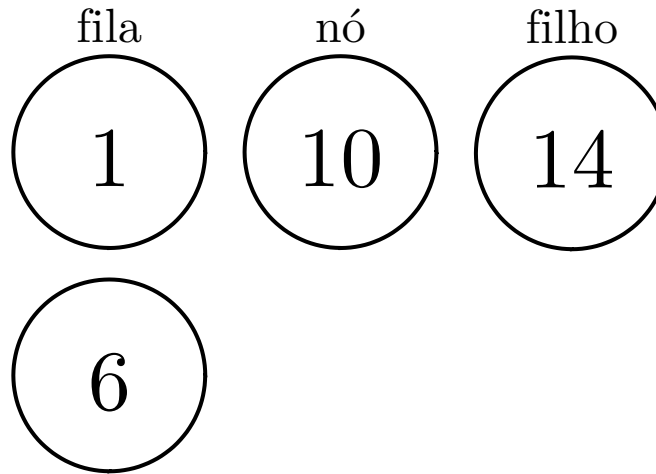
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busca em largura

➡

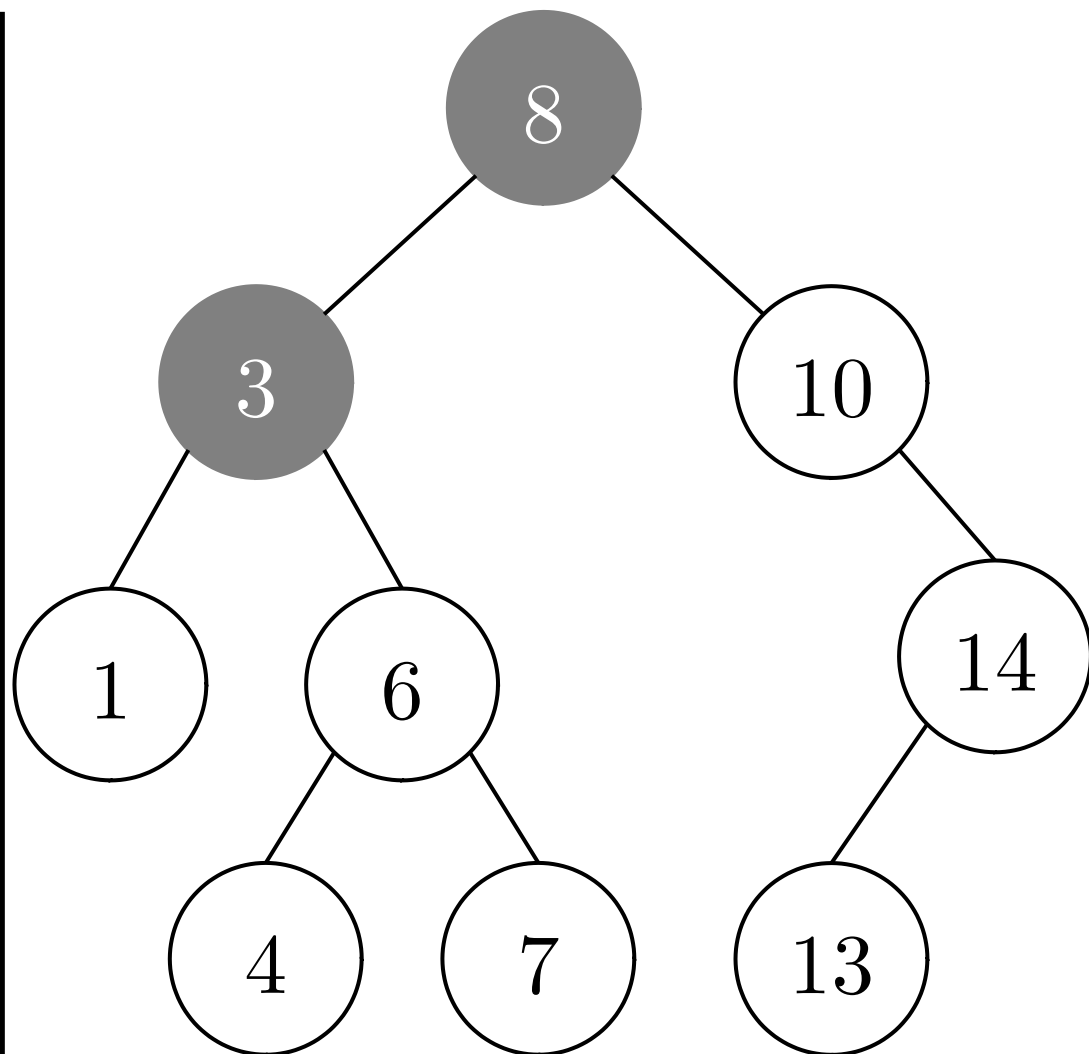
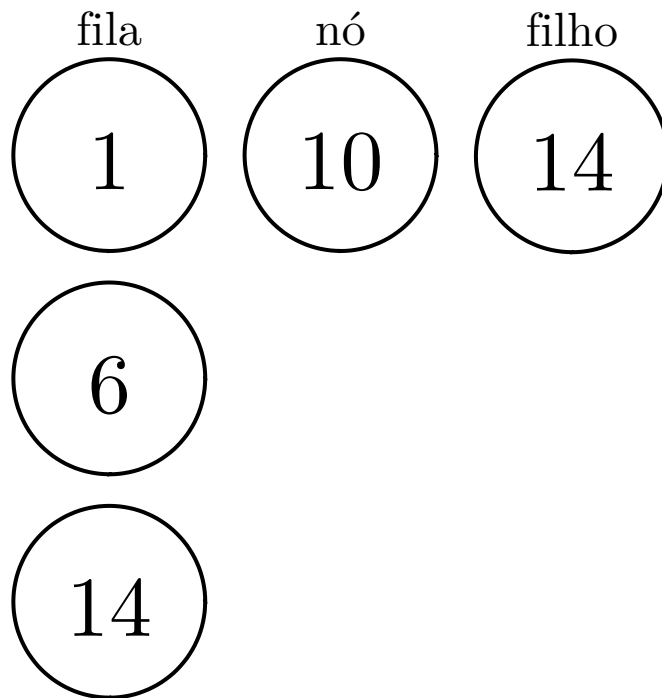
```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```



busca em largura

➡

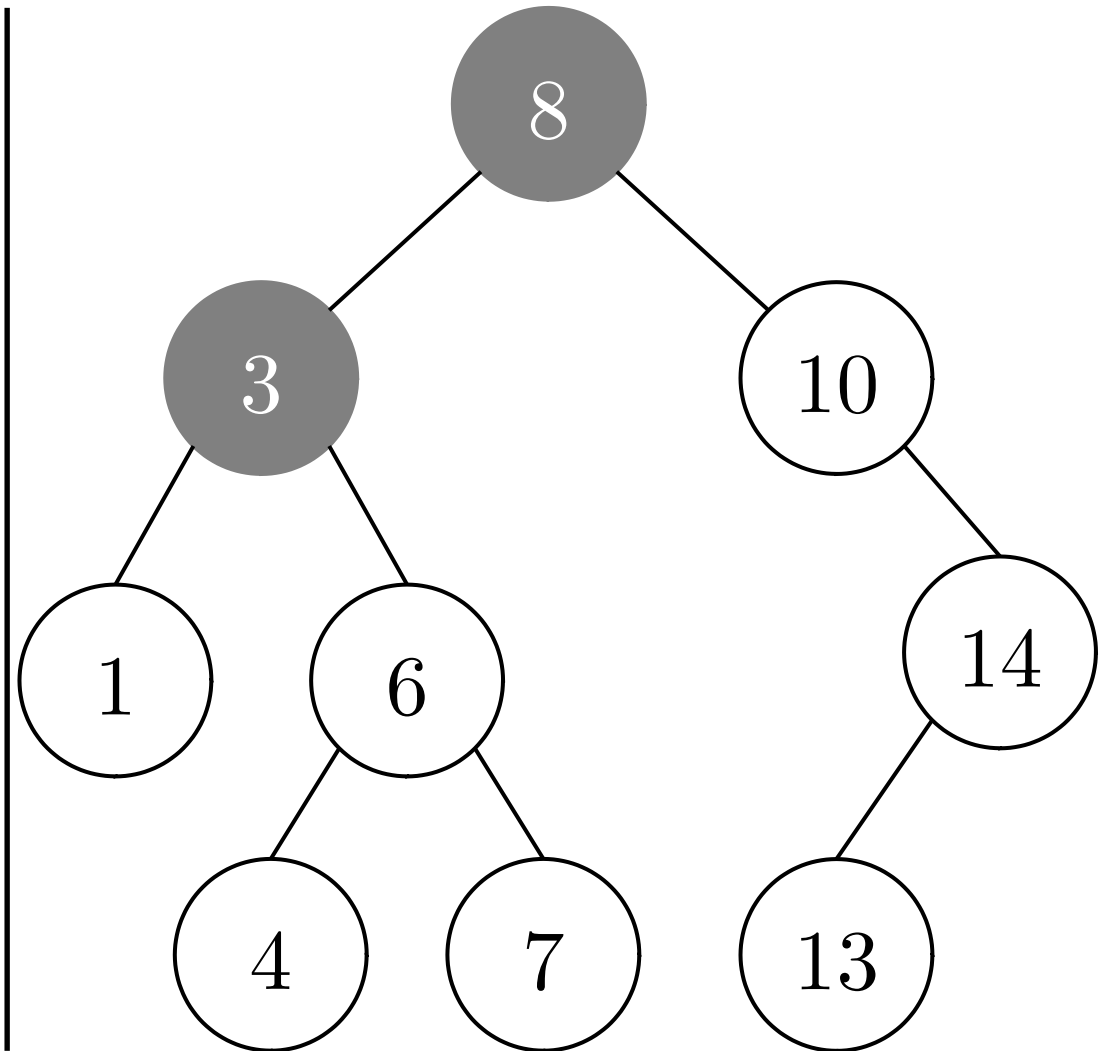
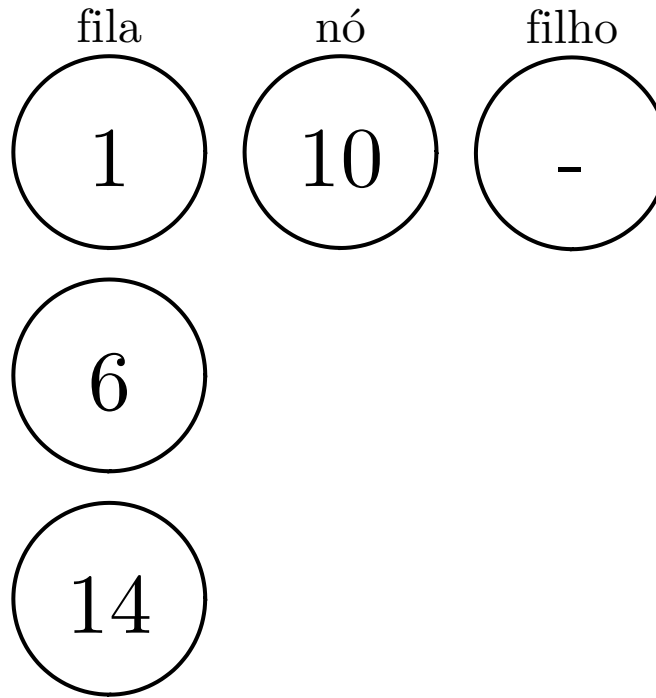
```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
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            if (not filho.visited):  
                fila.enqueue(filho)  
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```



busca em largura

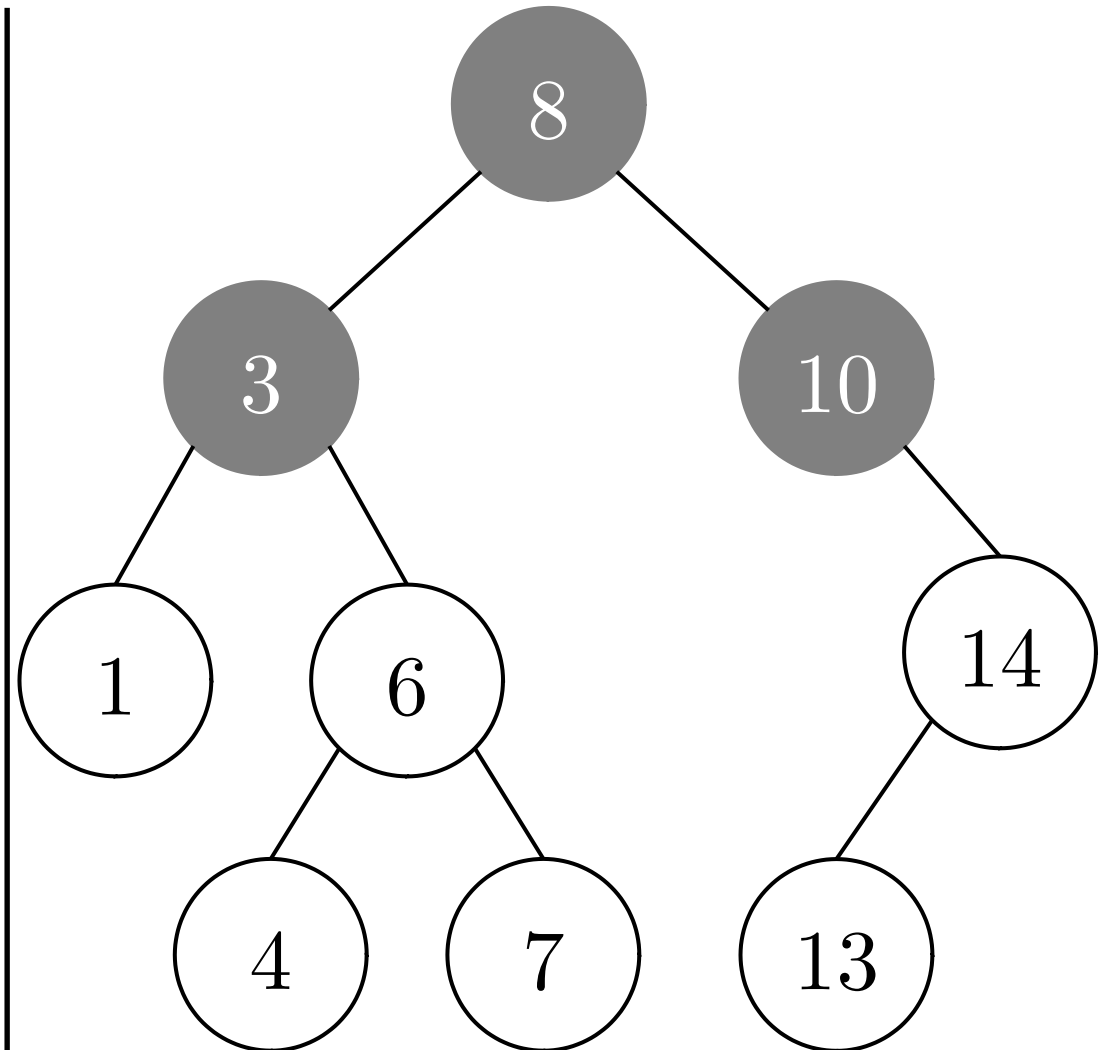
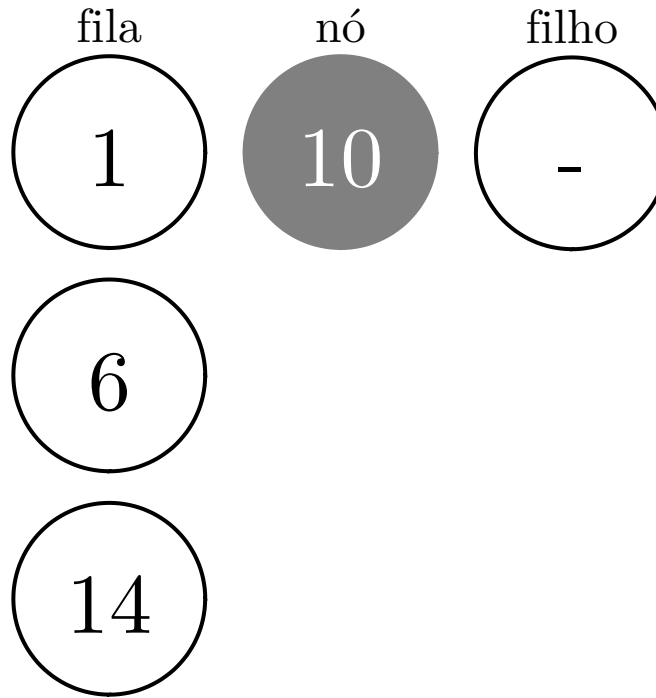
➔

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
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        for filho in nó.children():  
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                fila.enqueue(filho)  
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busca em largura

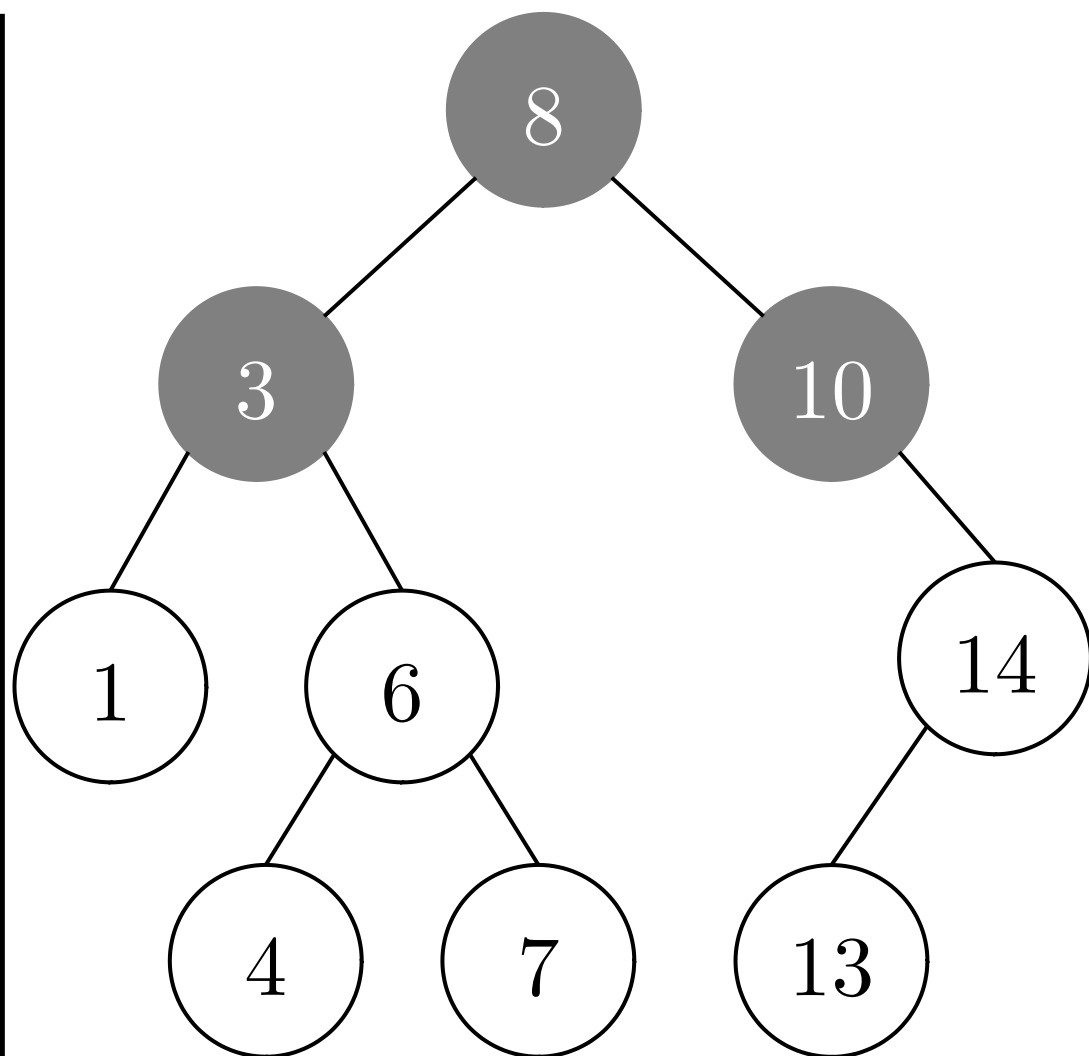
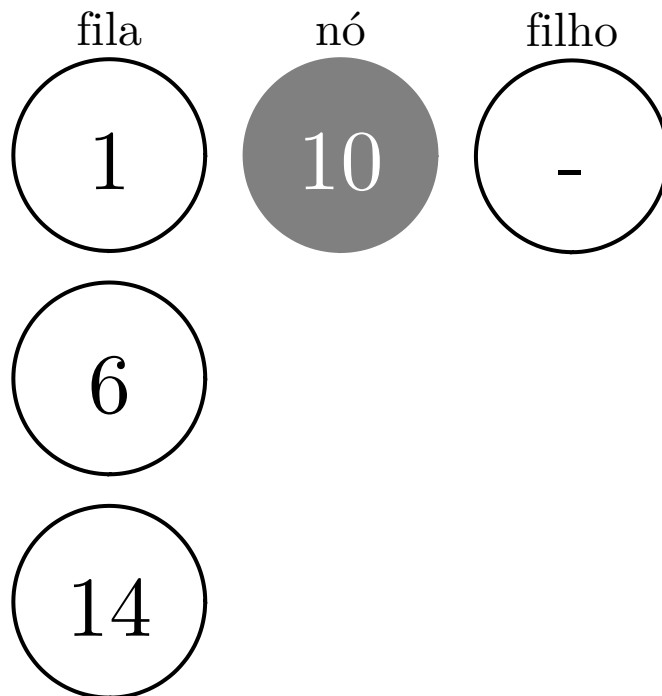
```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
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busca em largura

➔

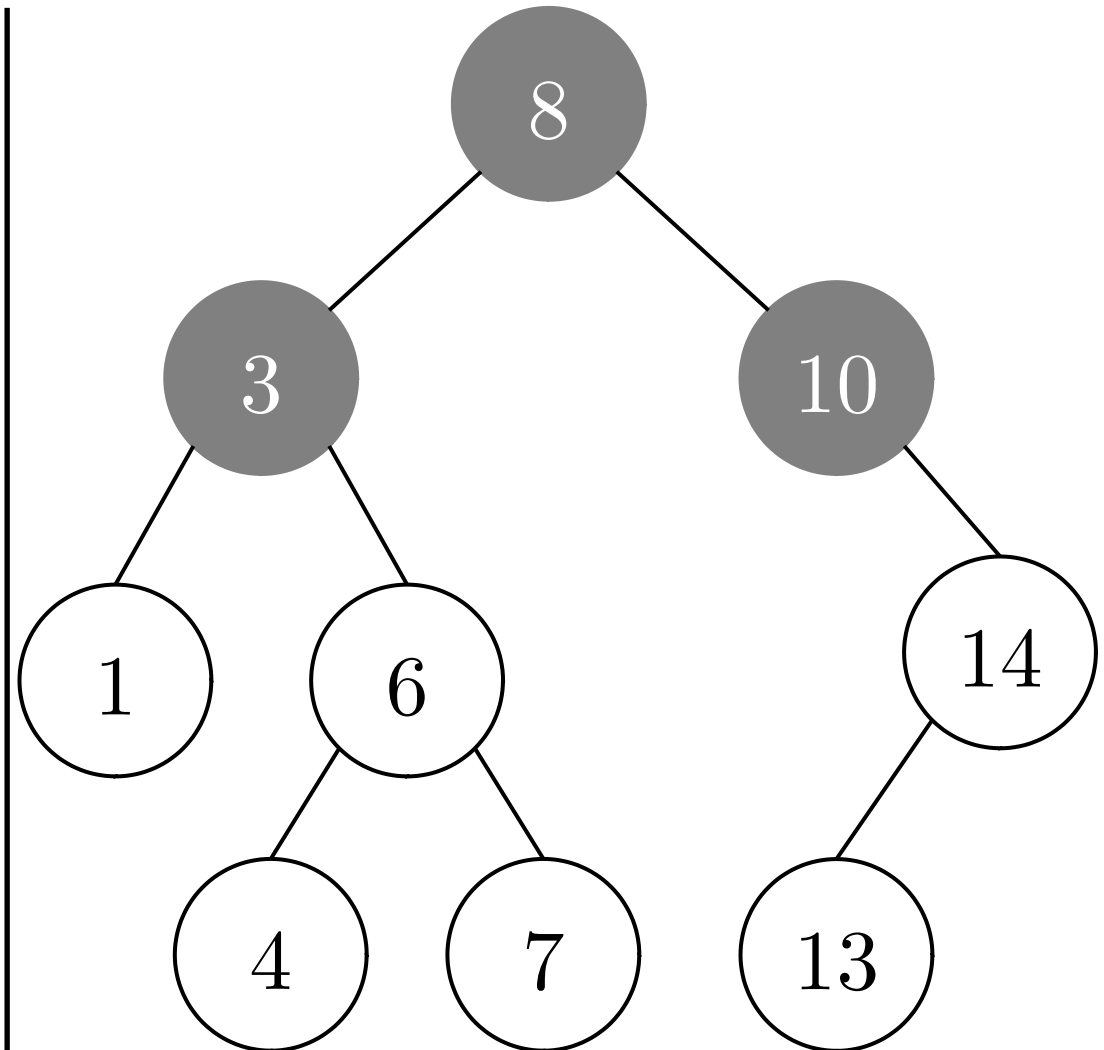
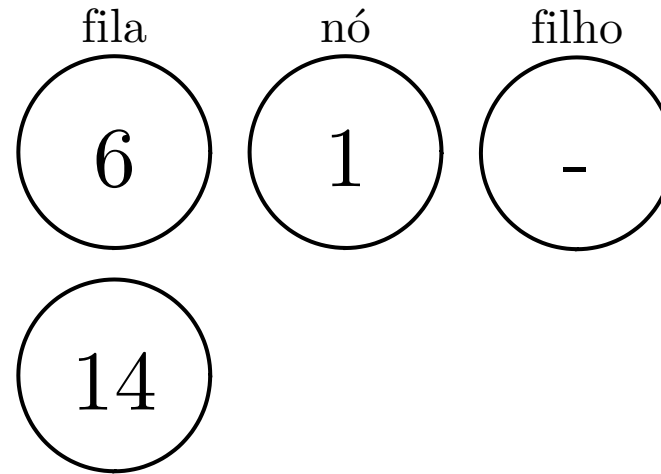
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busca em largura

➔

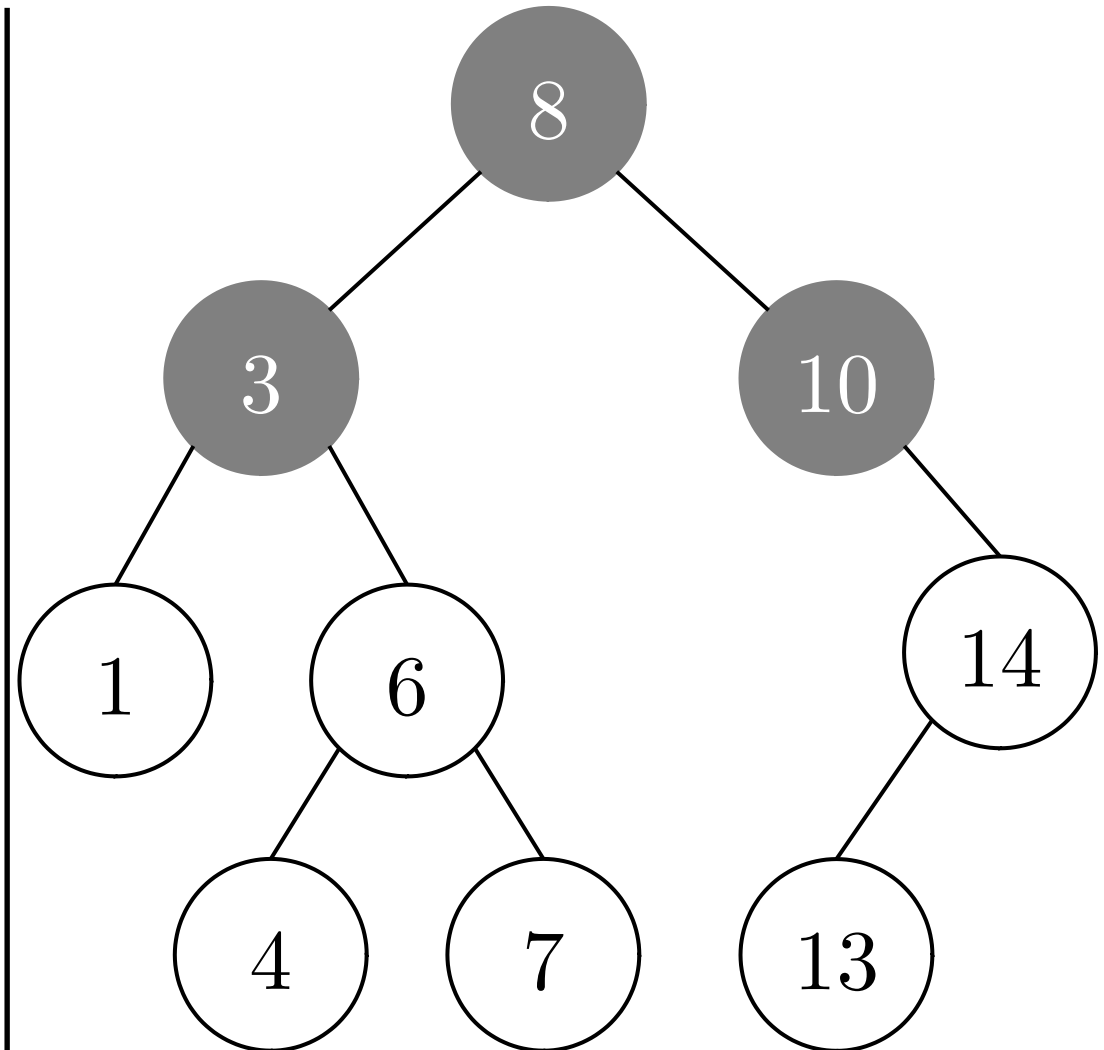
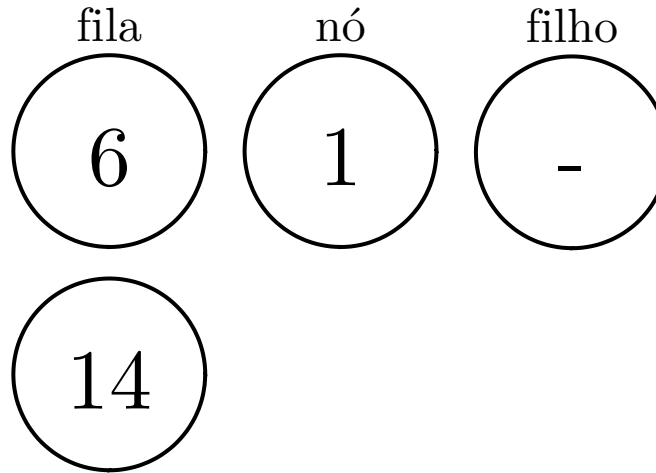
```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
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        nó = fila.dequeue()  
        for filho in nó.children():  
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busca em largura

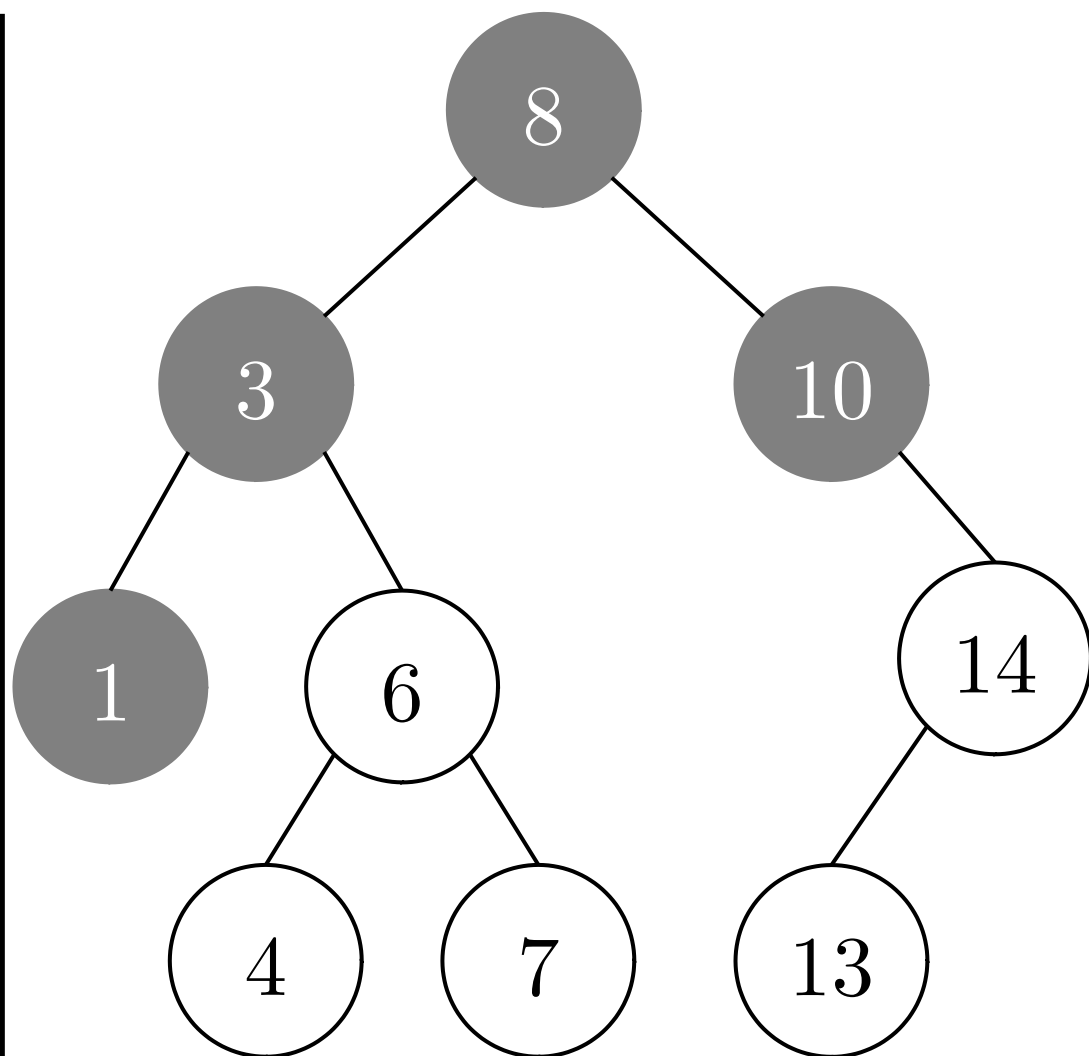
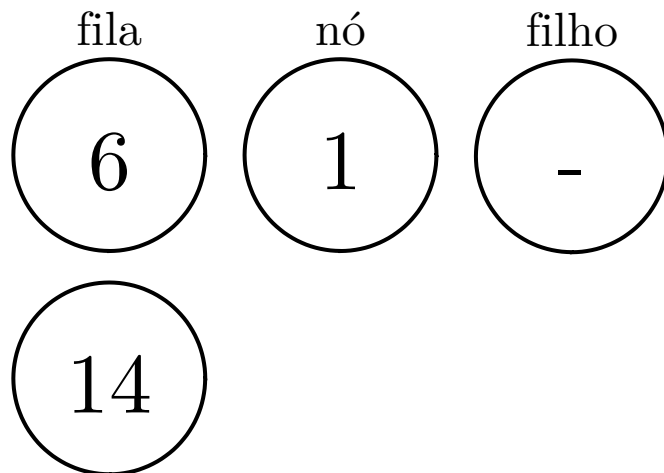
➔

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
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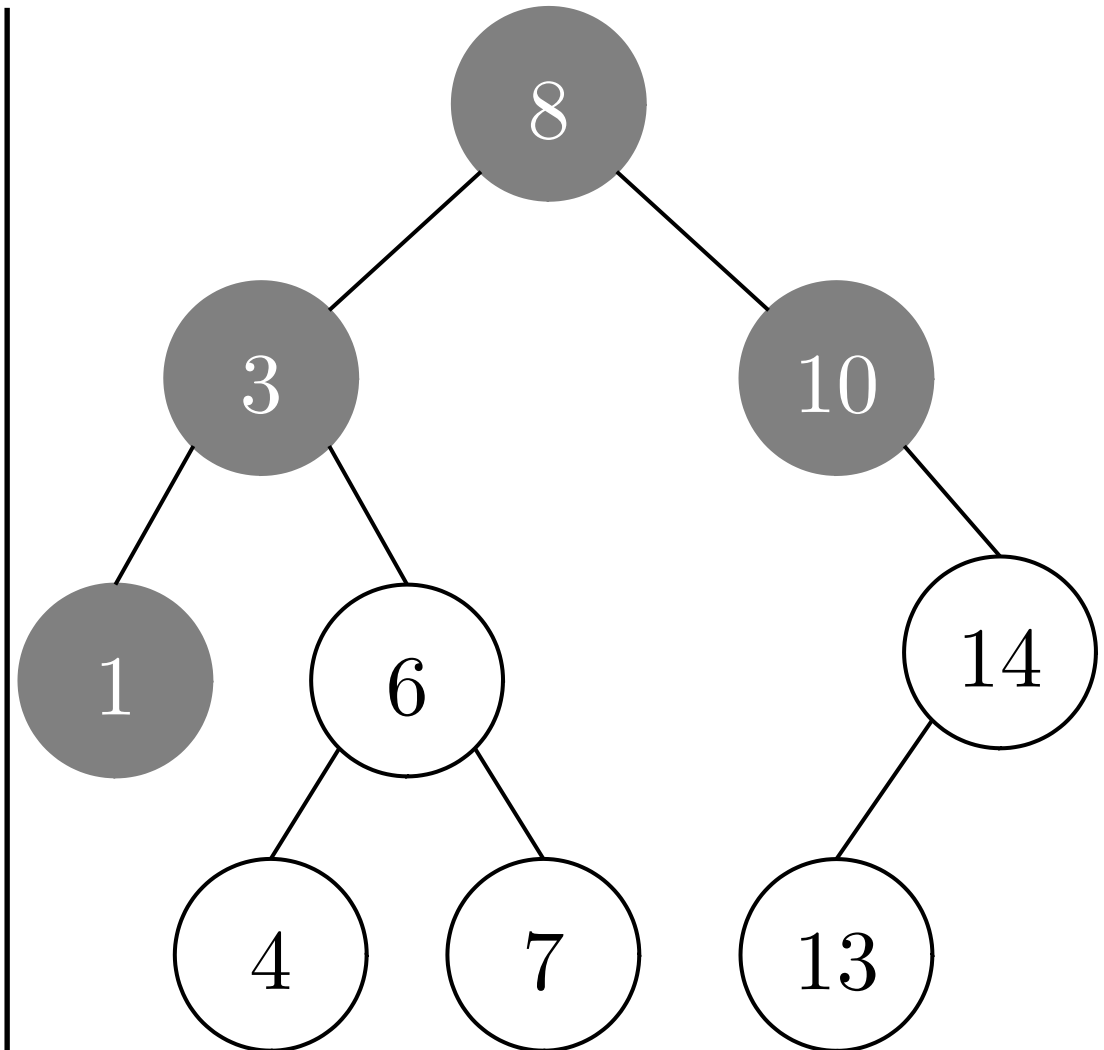
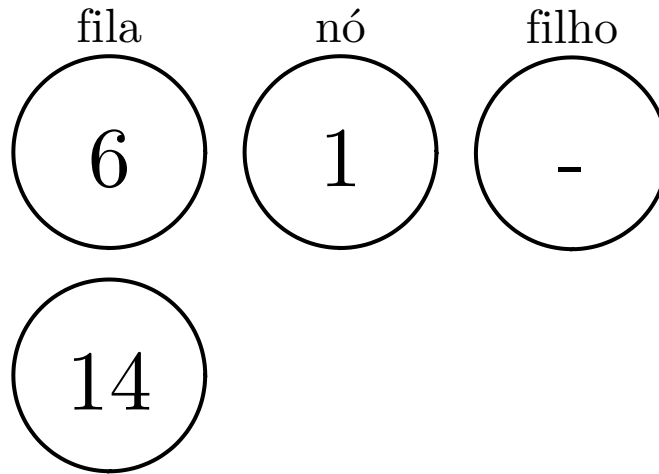
busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
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busca em largura

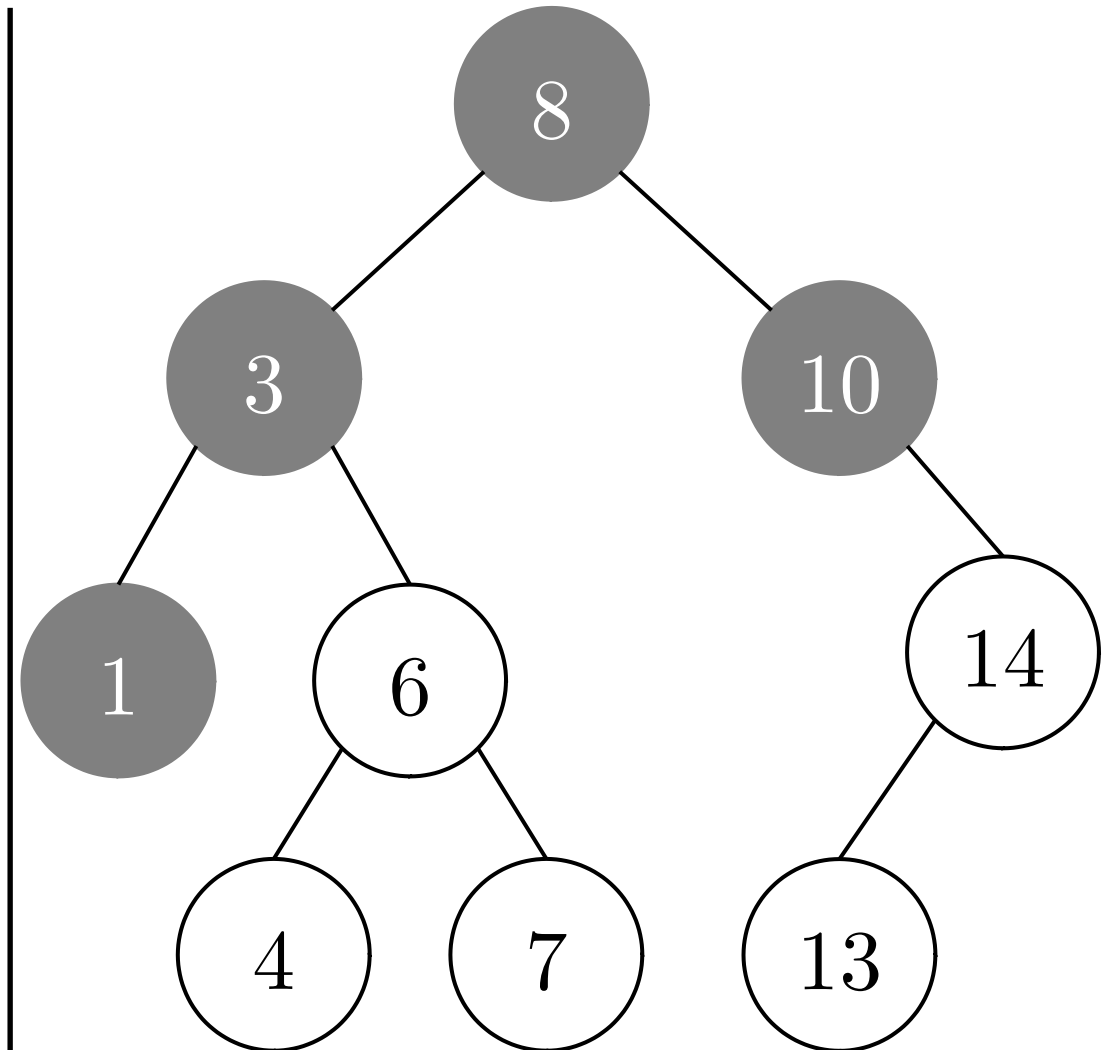
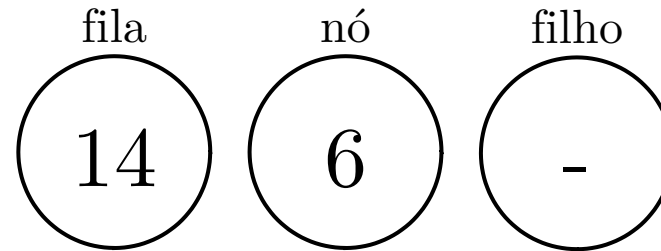
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busca em largura

➔

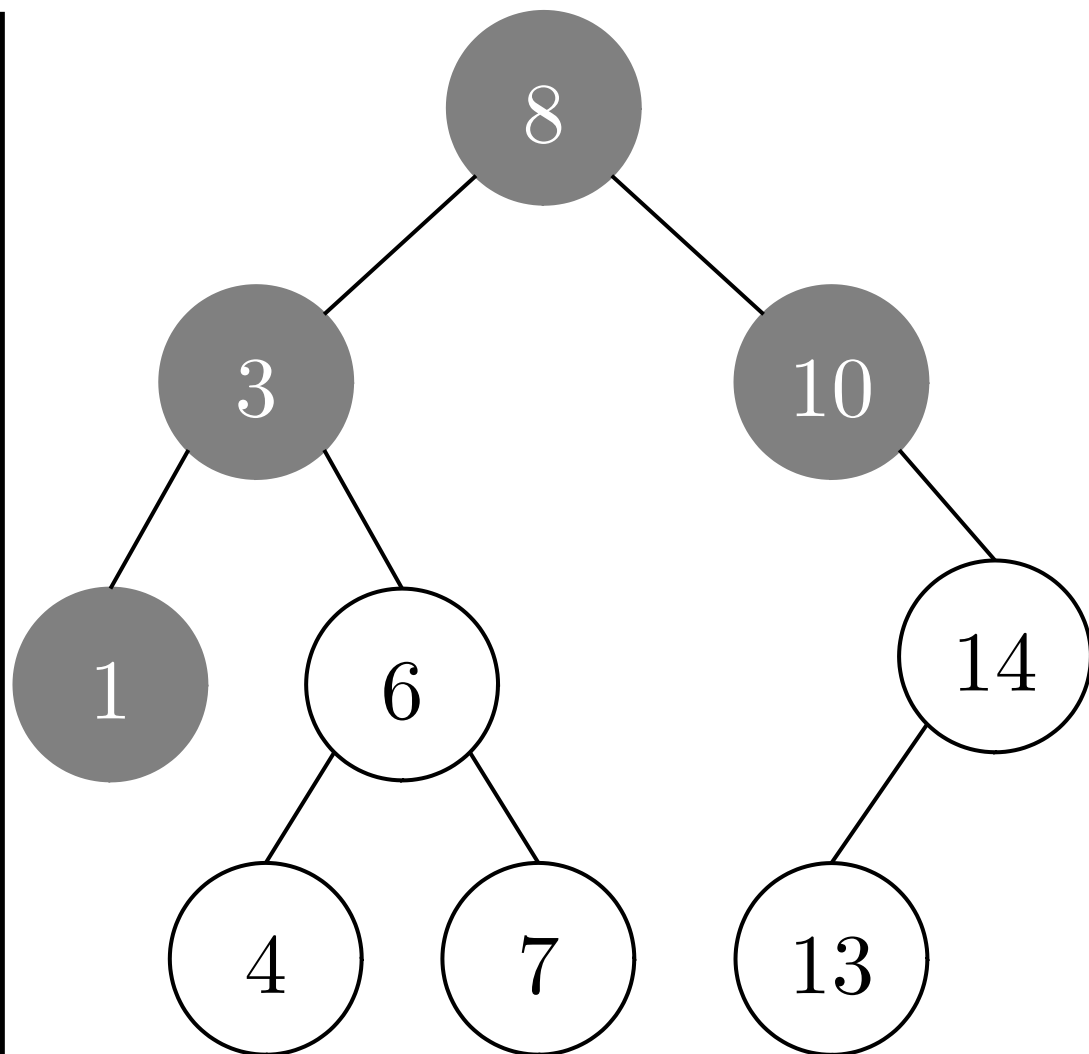
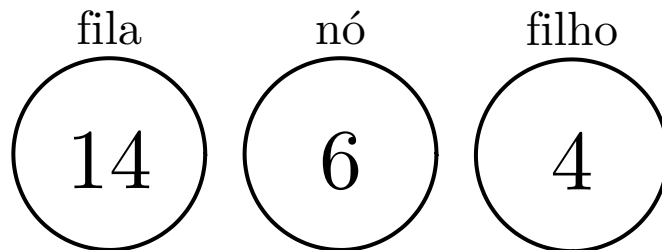
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busca em largura

➡

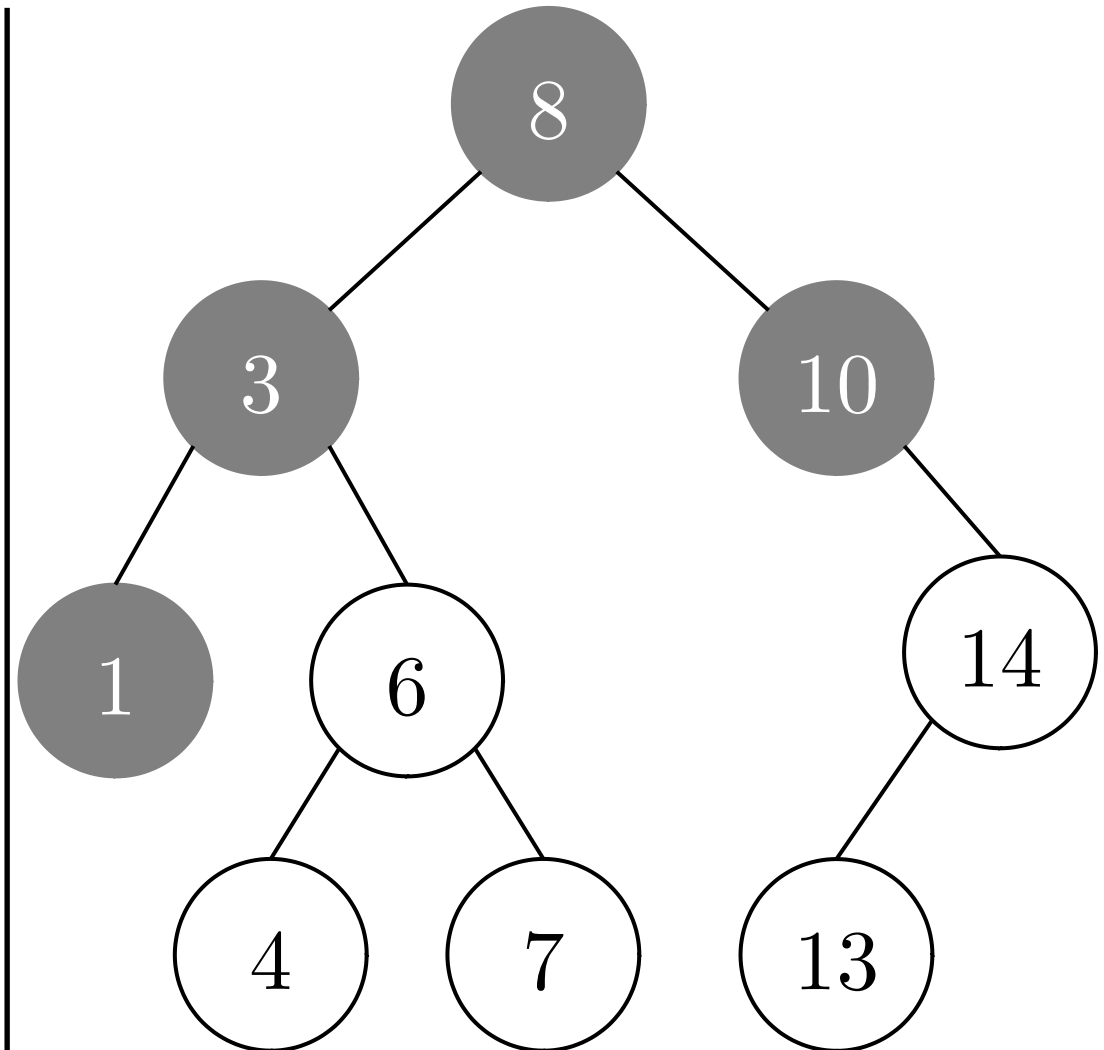
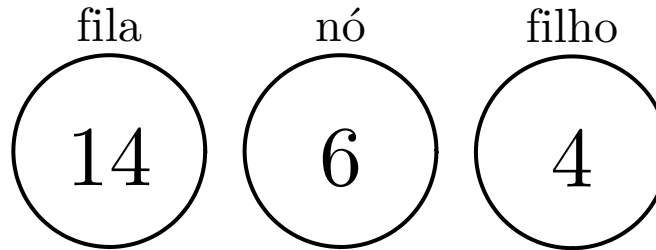
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    fila = Fila()  
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busca em largura

➡

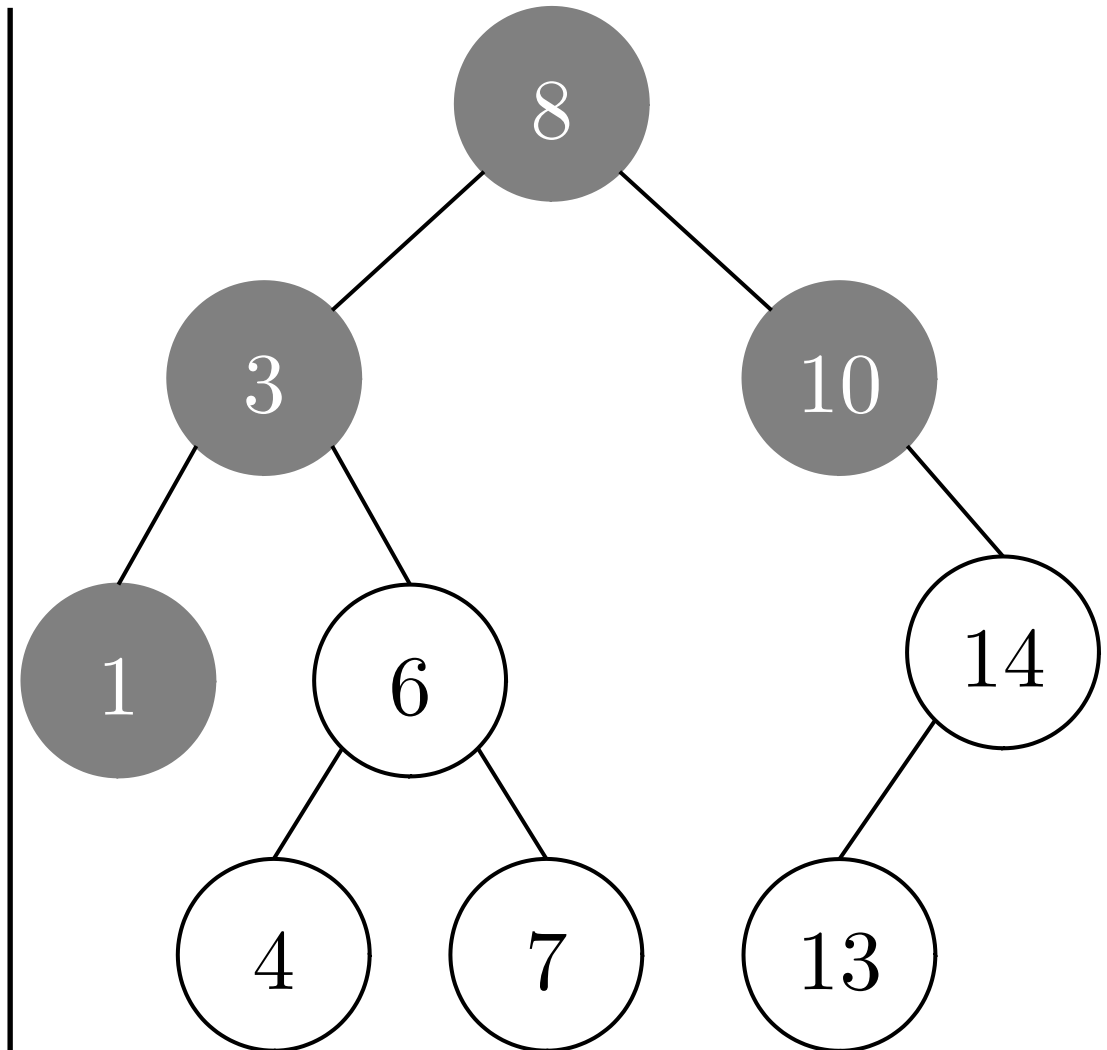
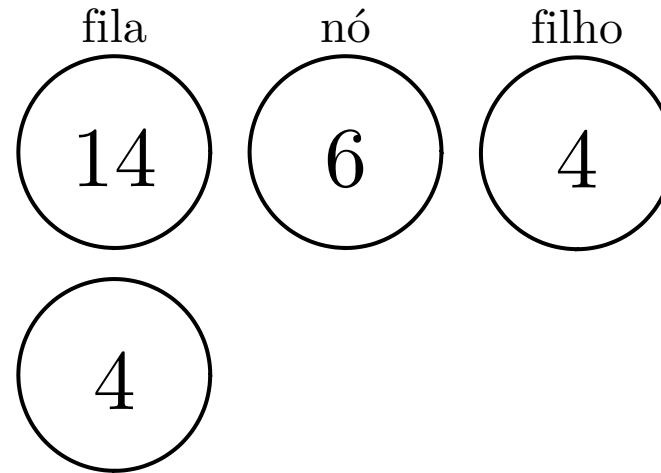
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busca em largura

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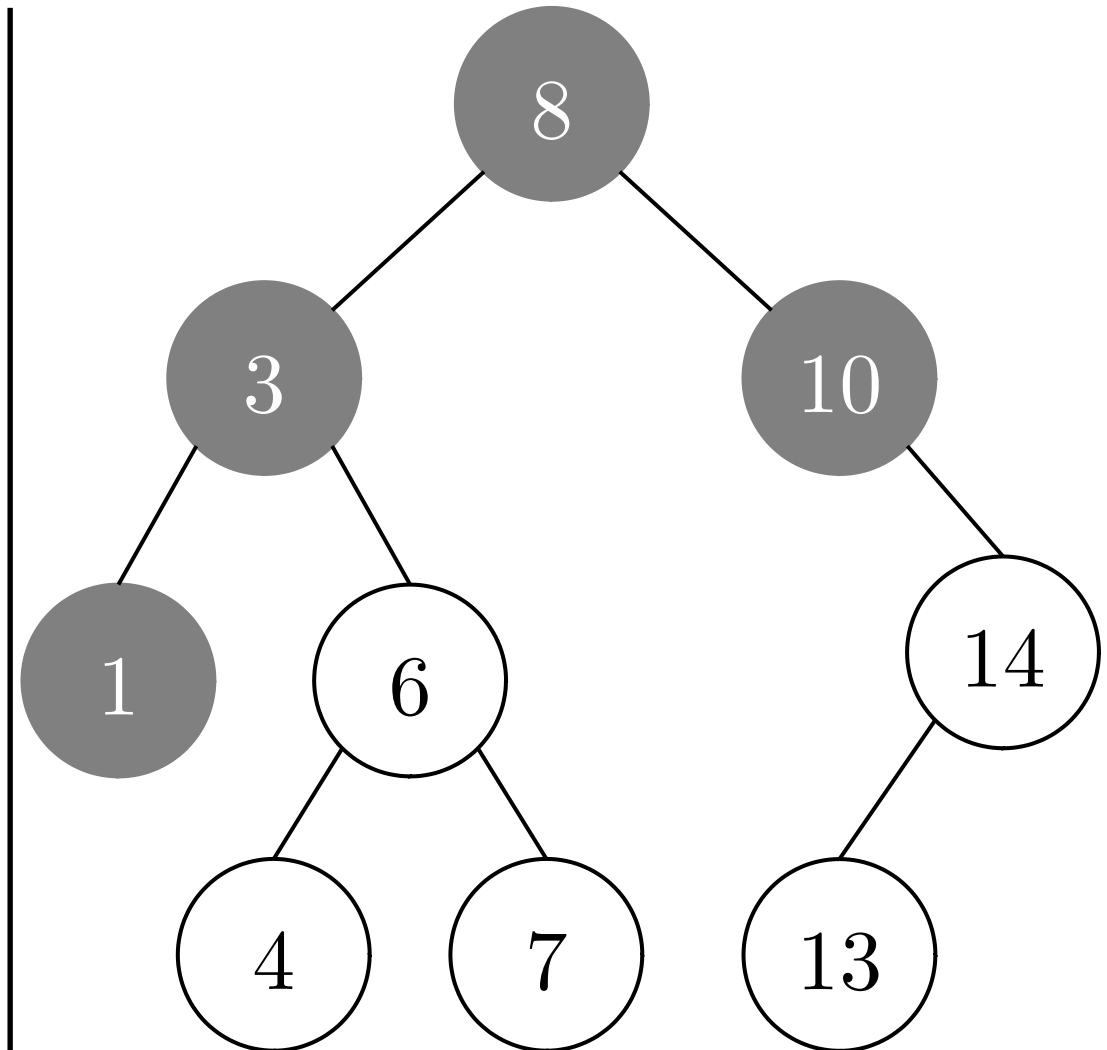
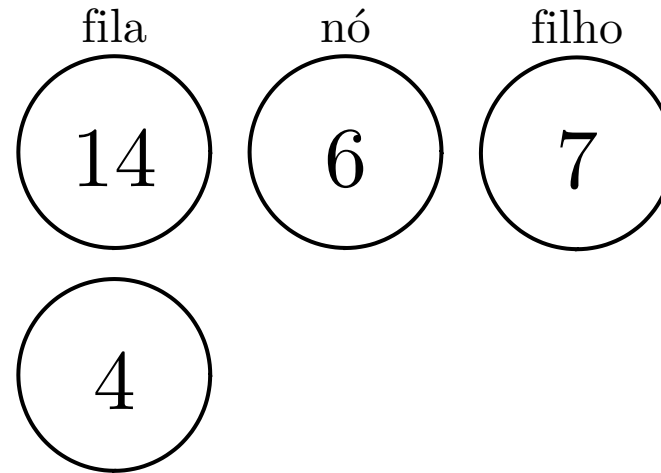
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busca em largura

➔

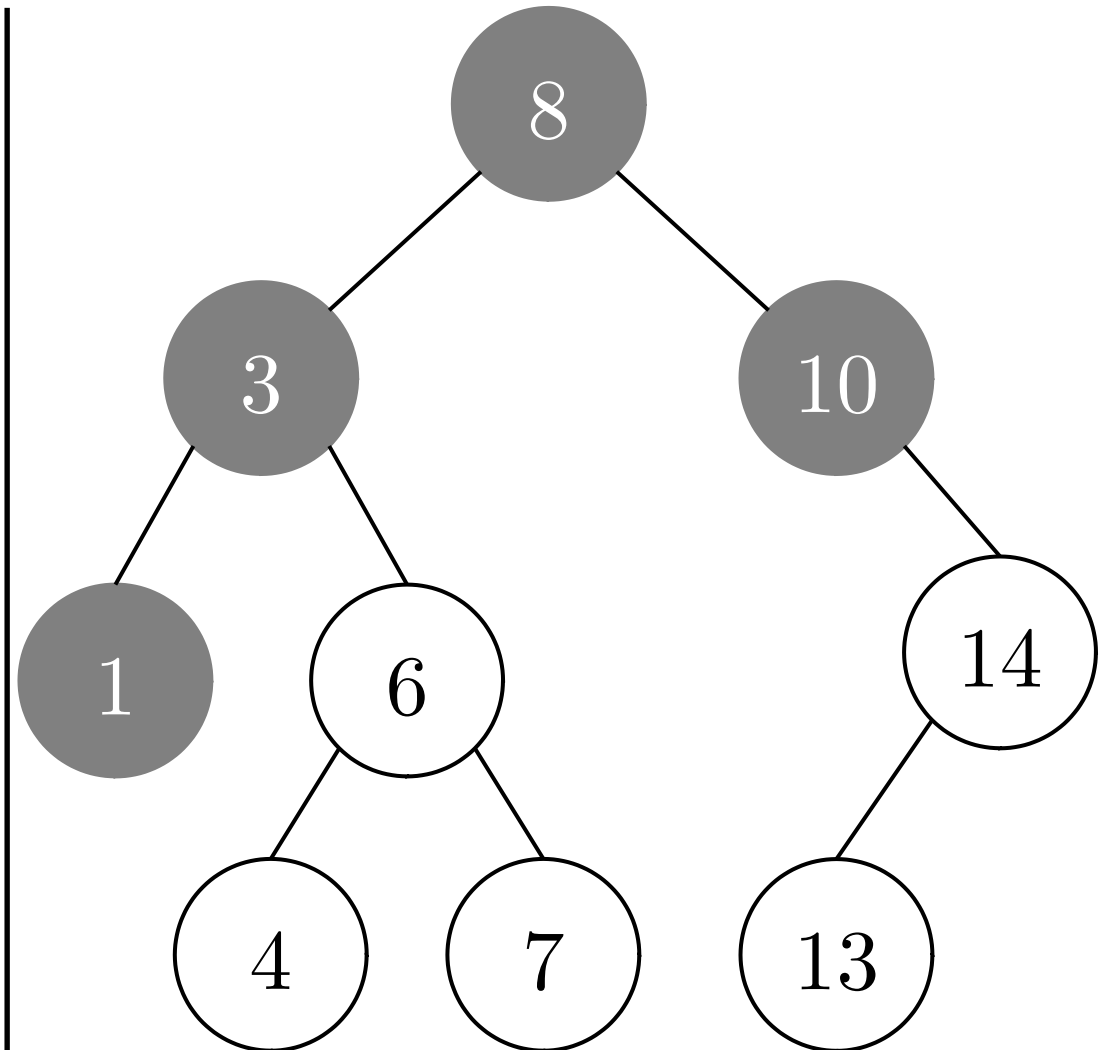
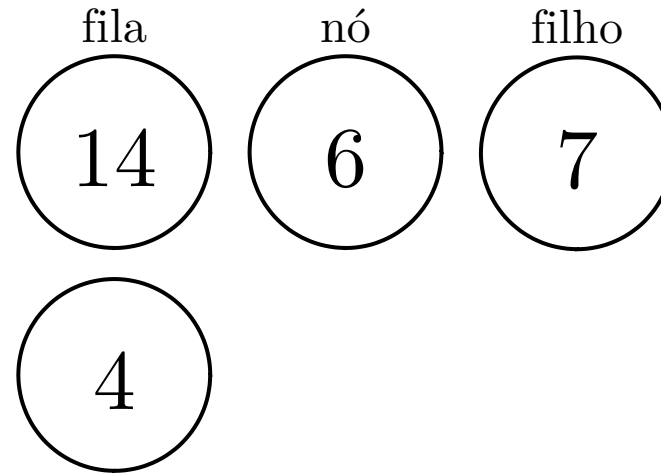
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busca em largura

➡

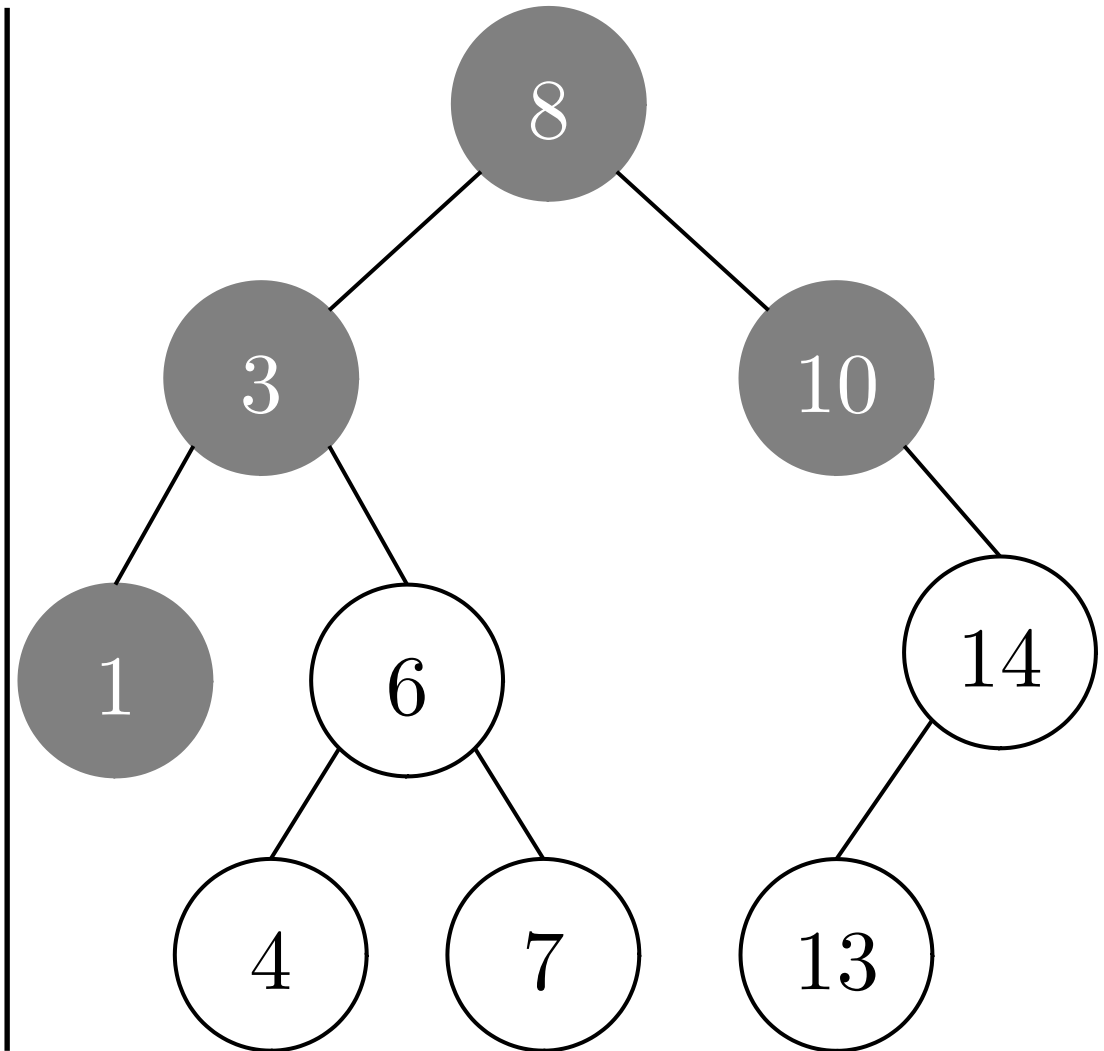
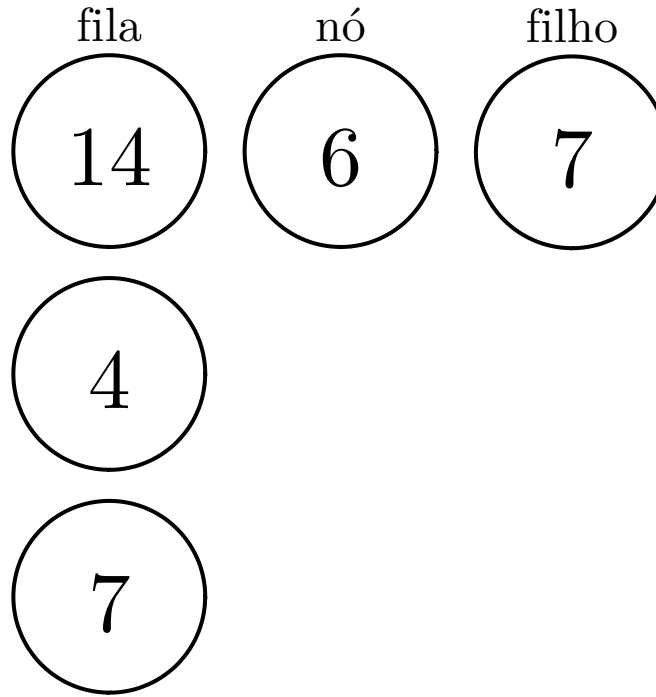
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busca em largura

➡

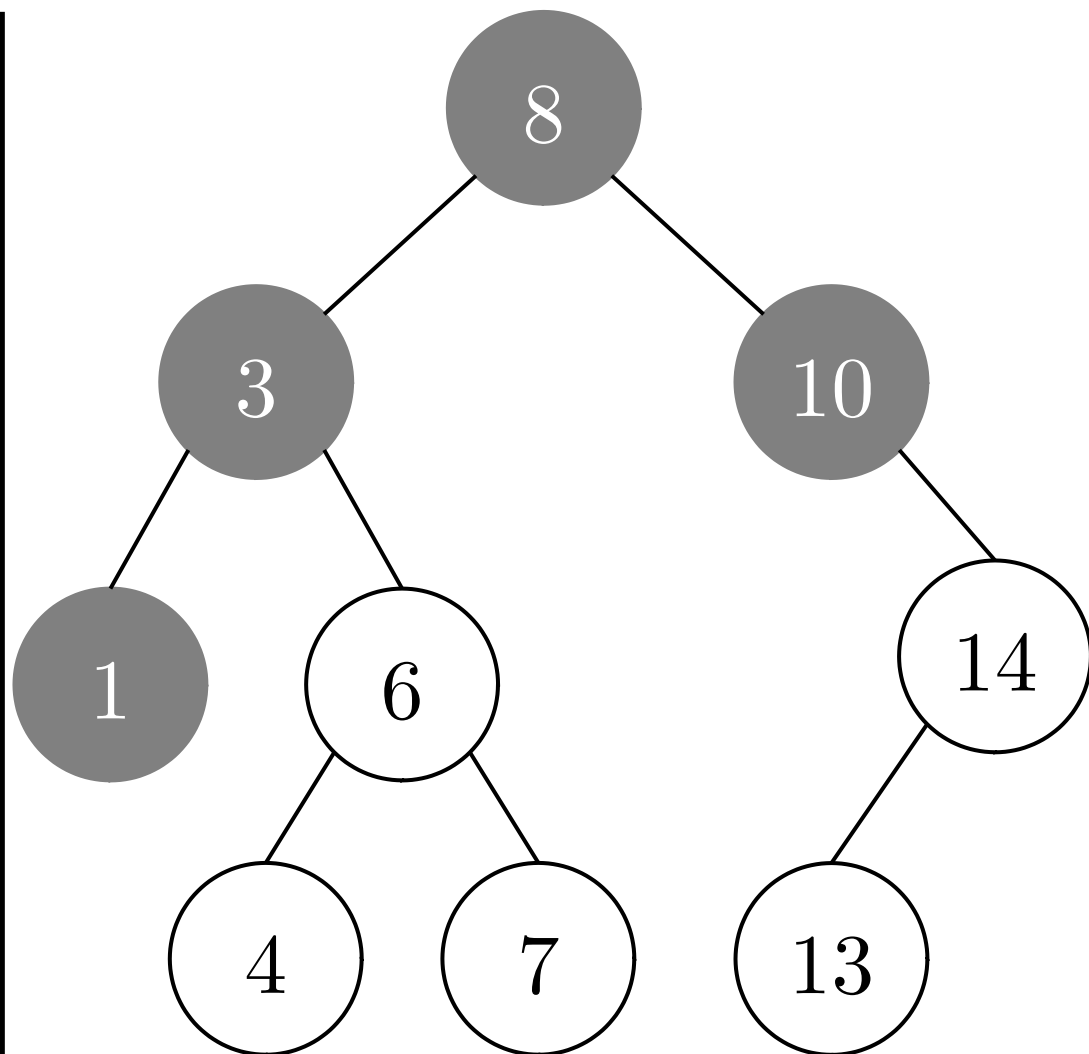
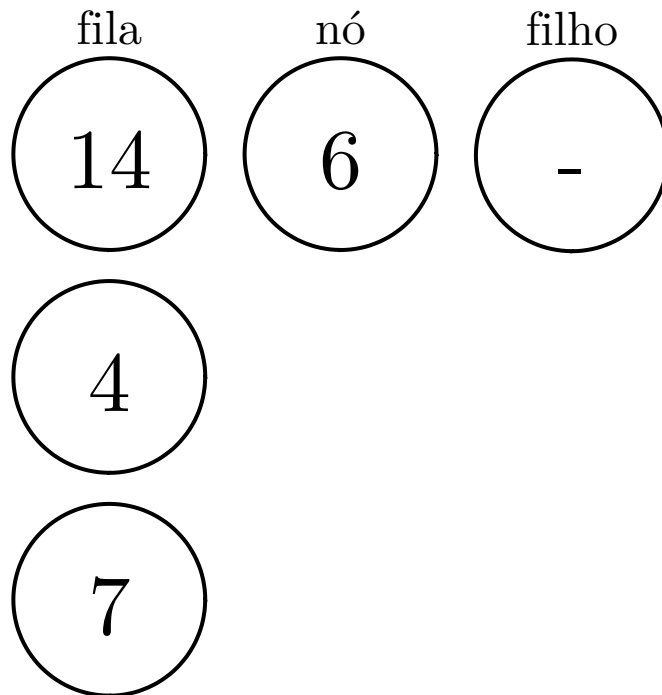
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busca em largura

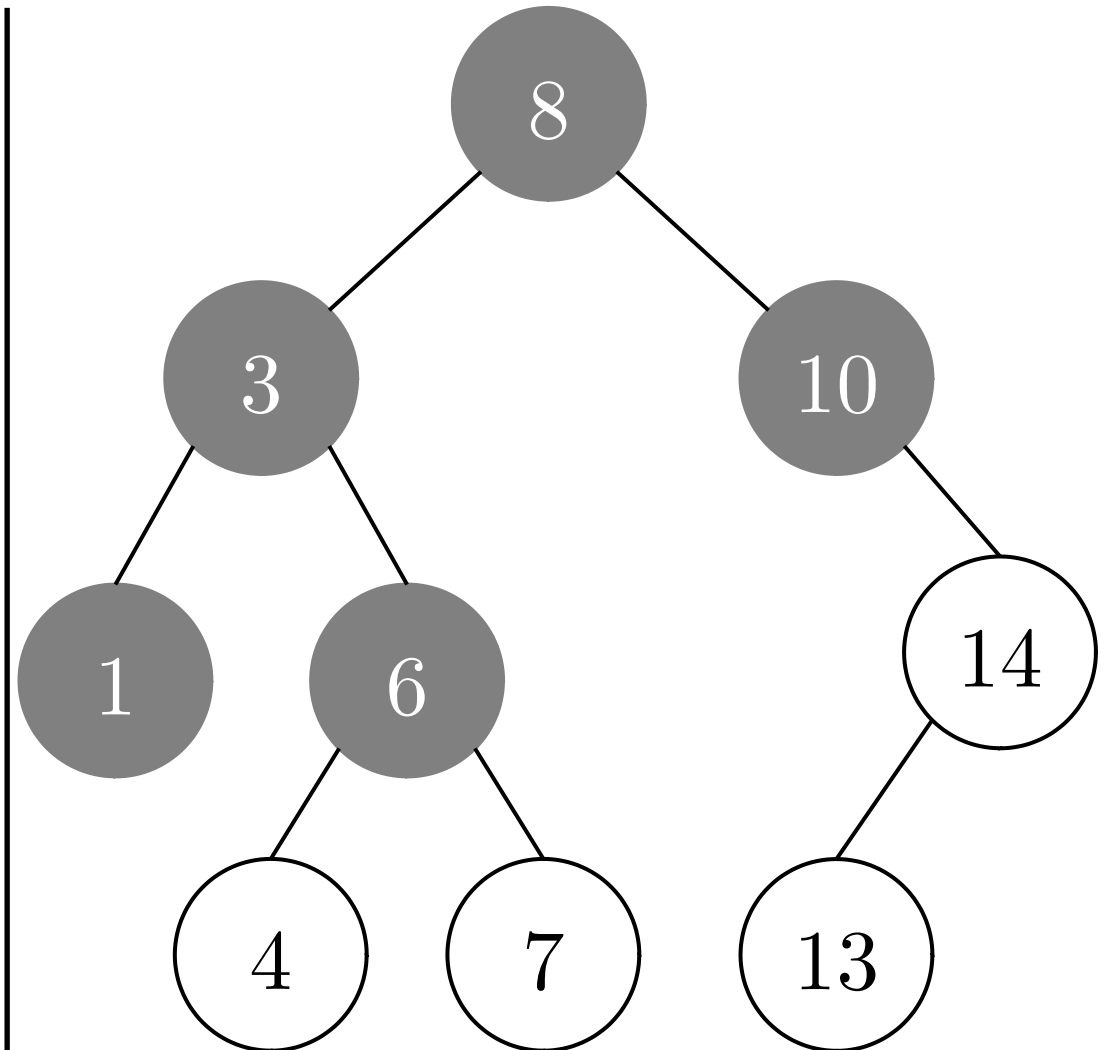
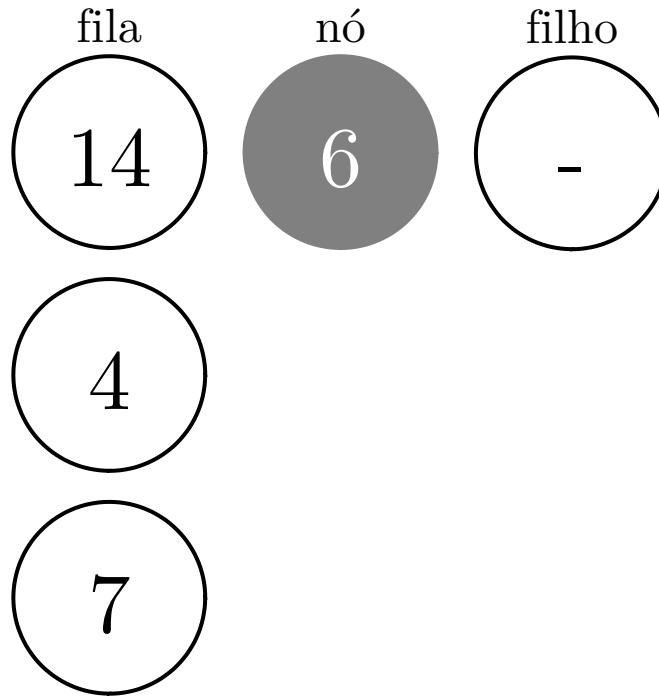
➔

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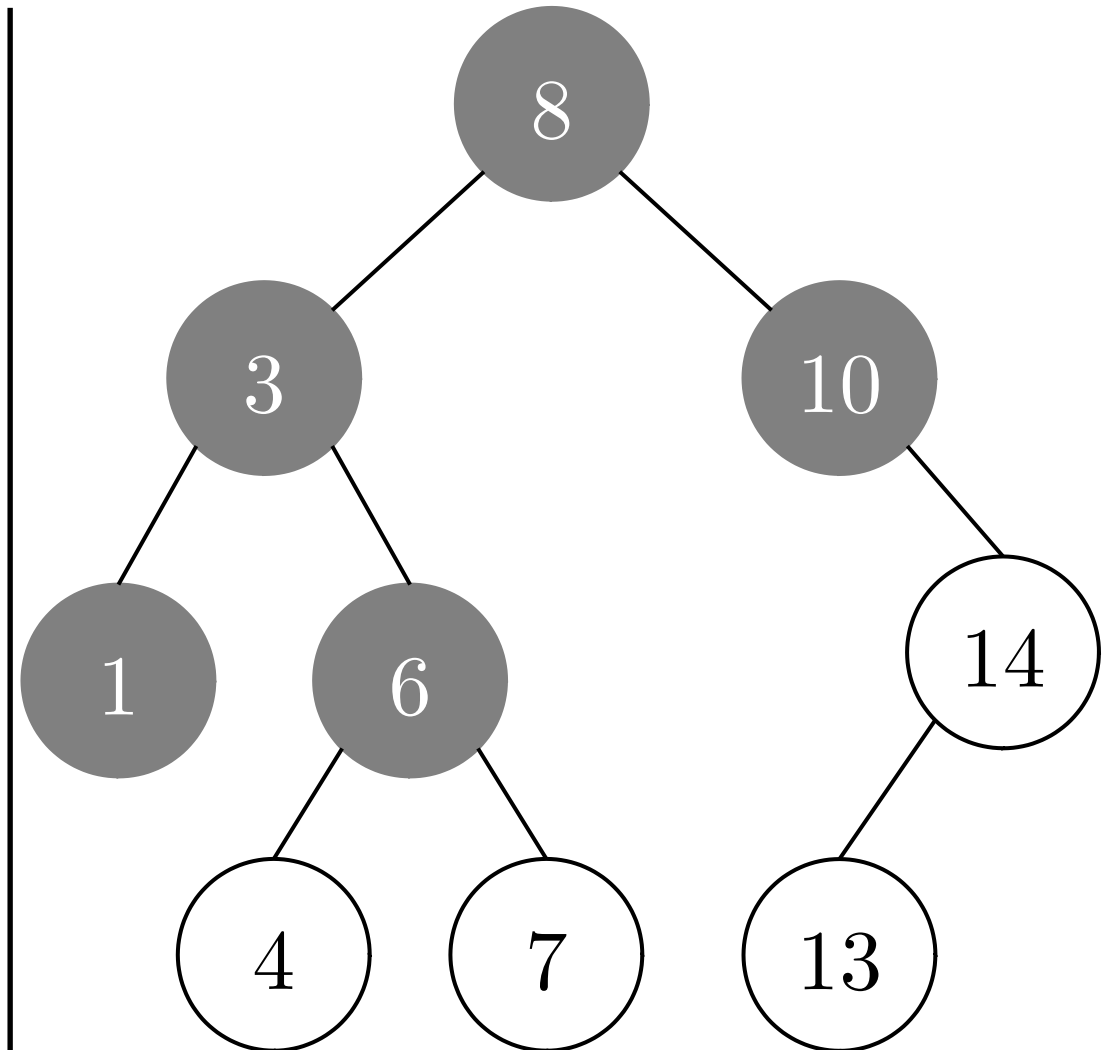
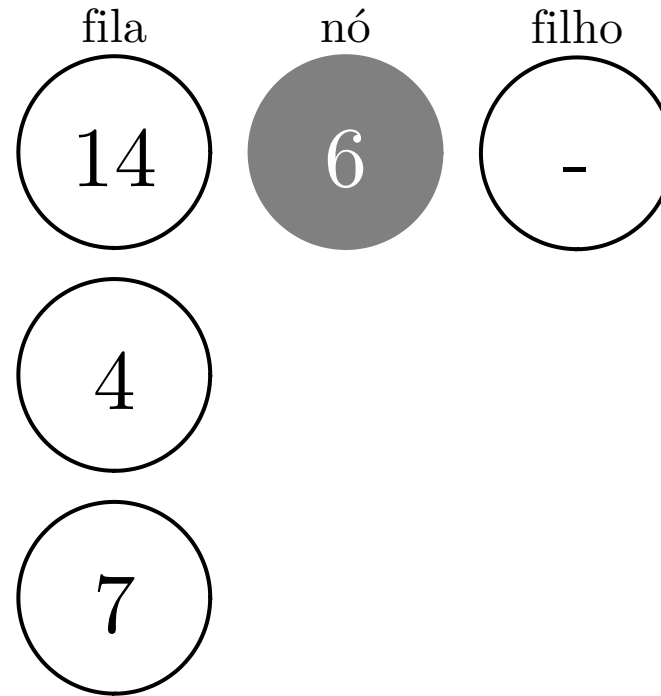
busca em largura

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busca em largura

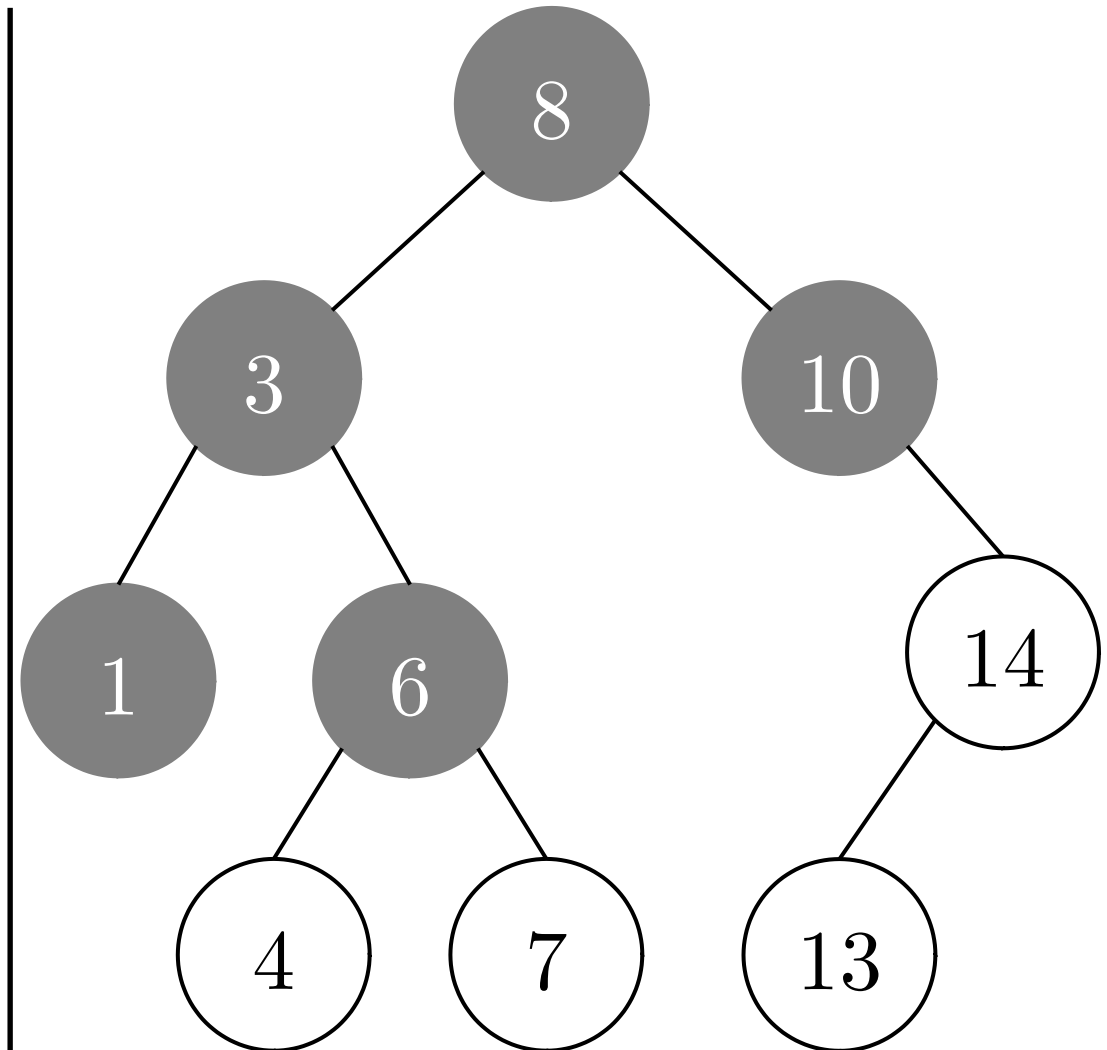
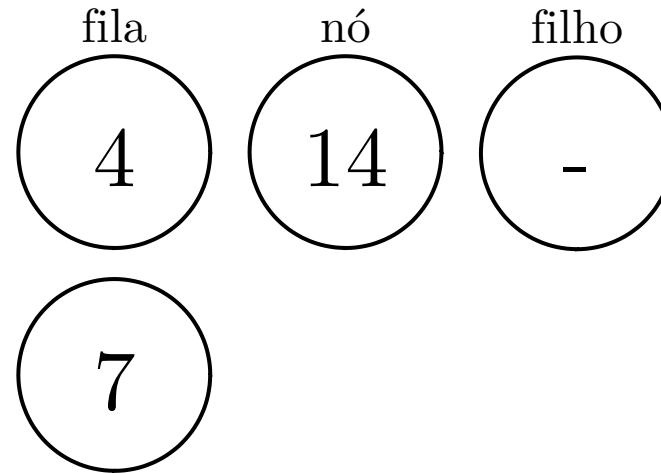
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busca em largura

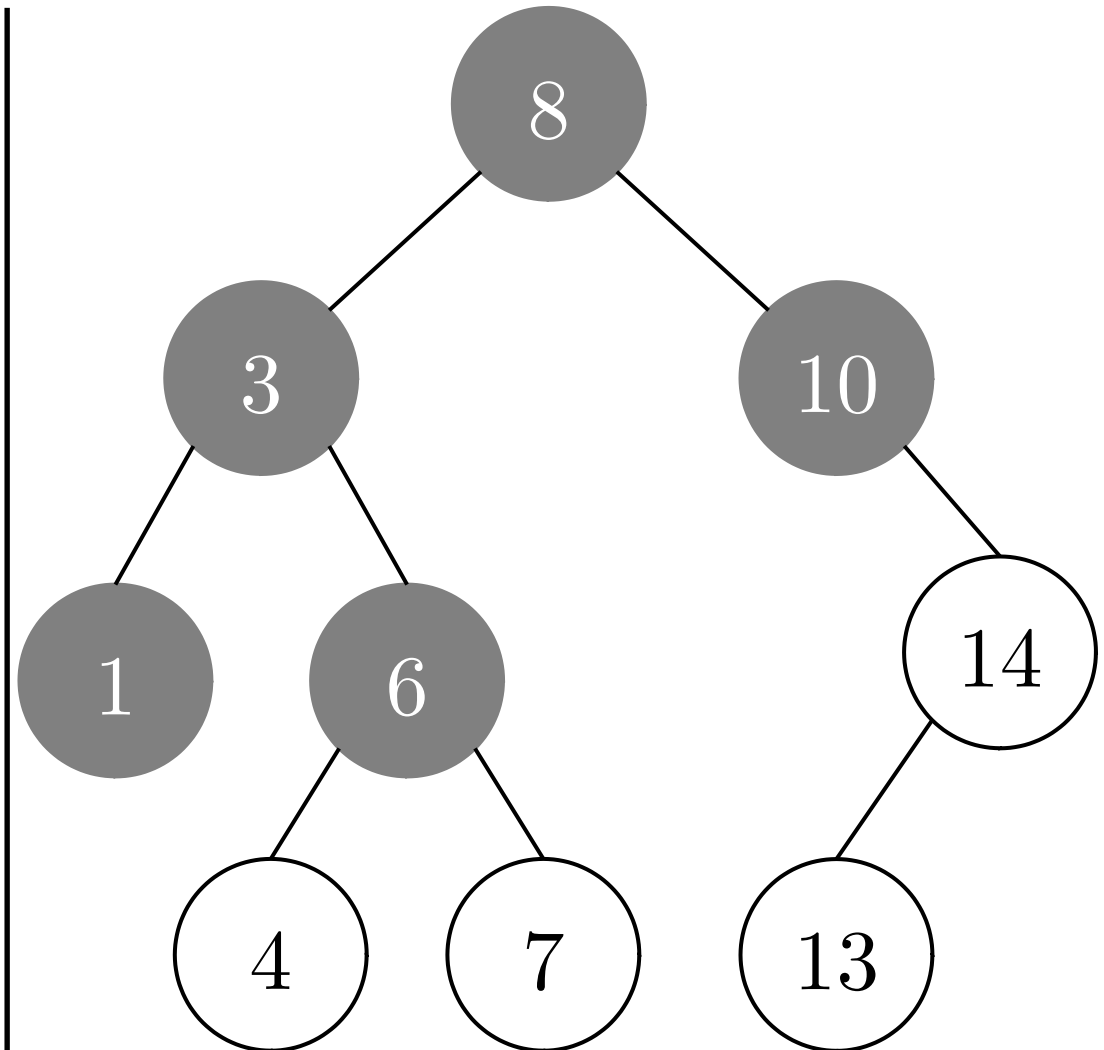
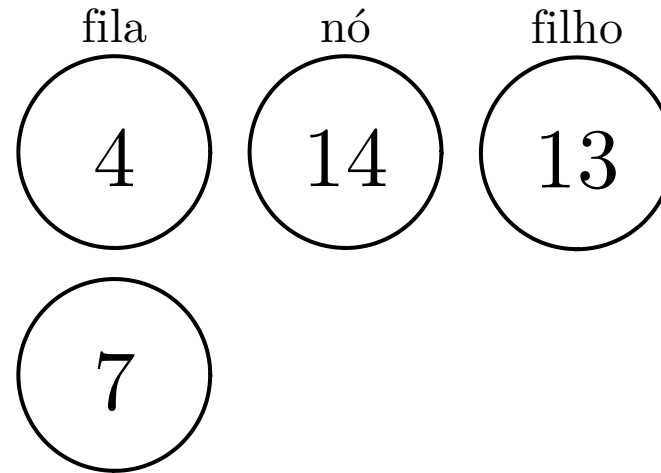
➔

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busca em largura

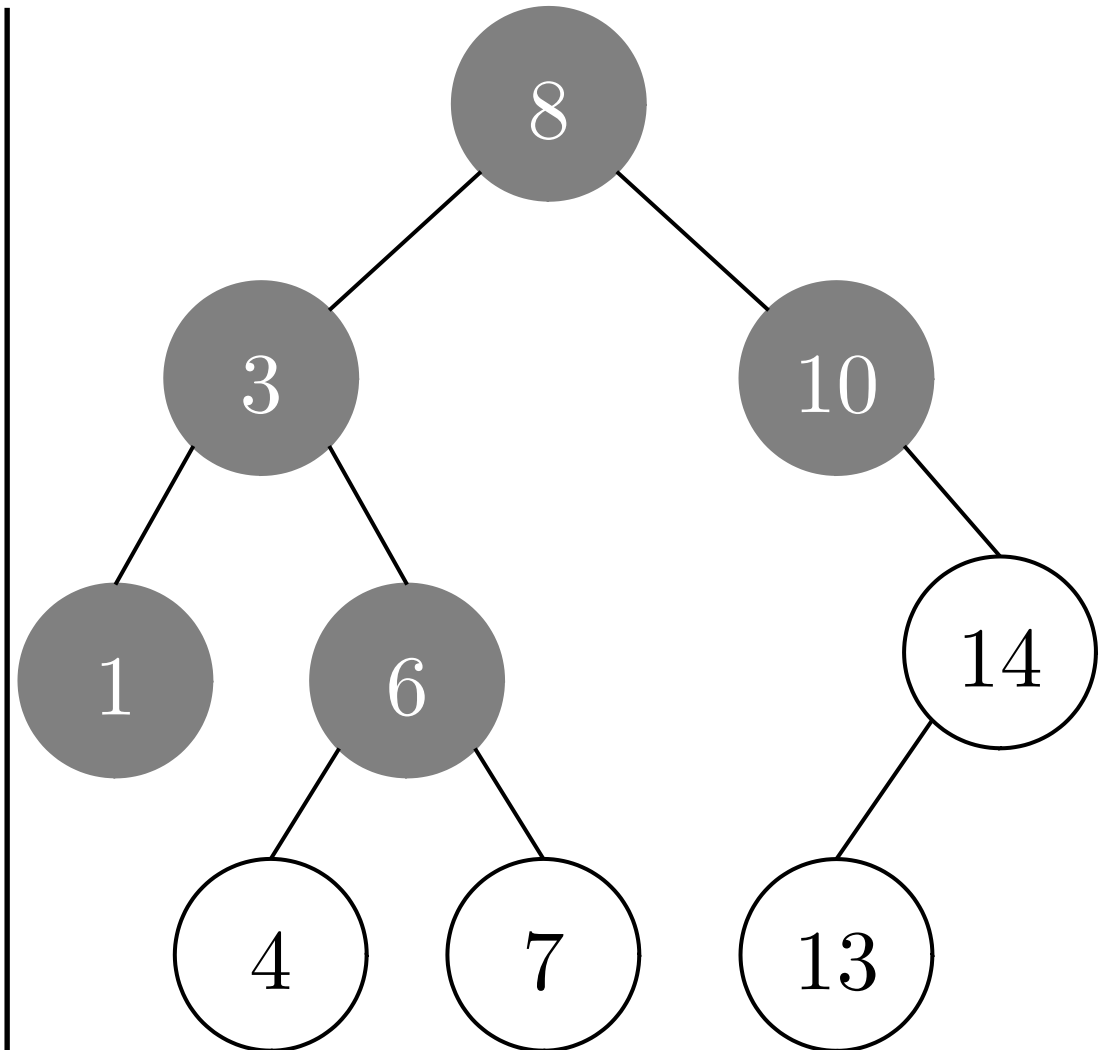
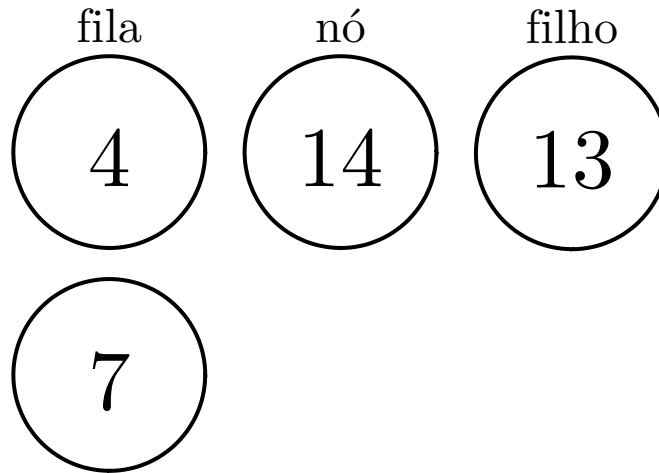
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busca em largura

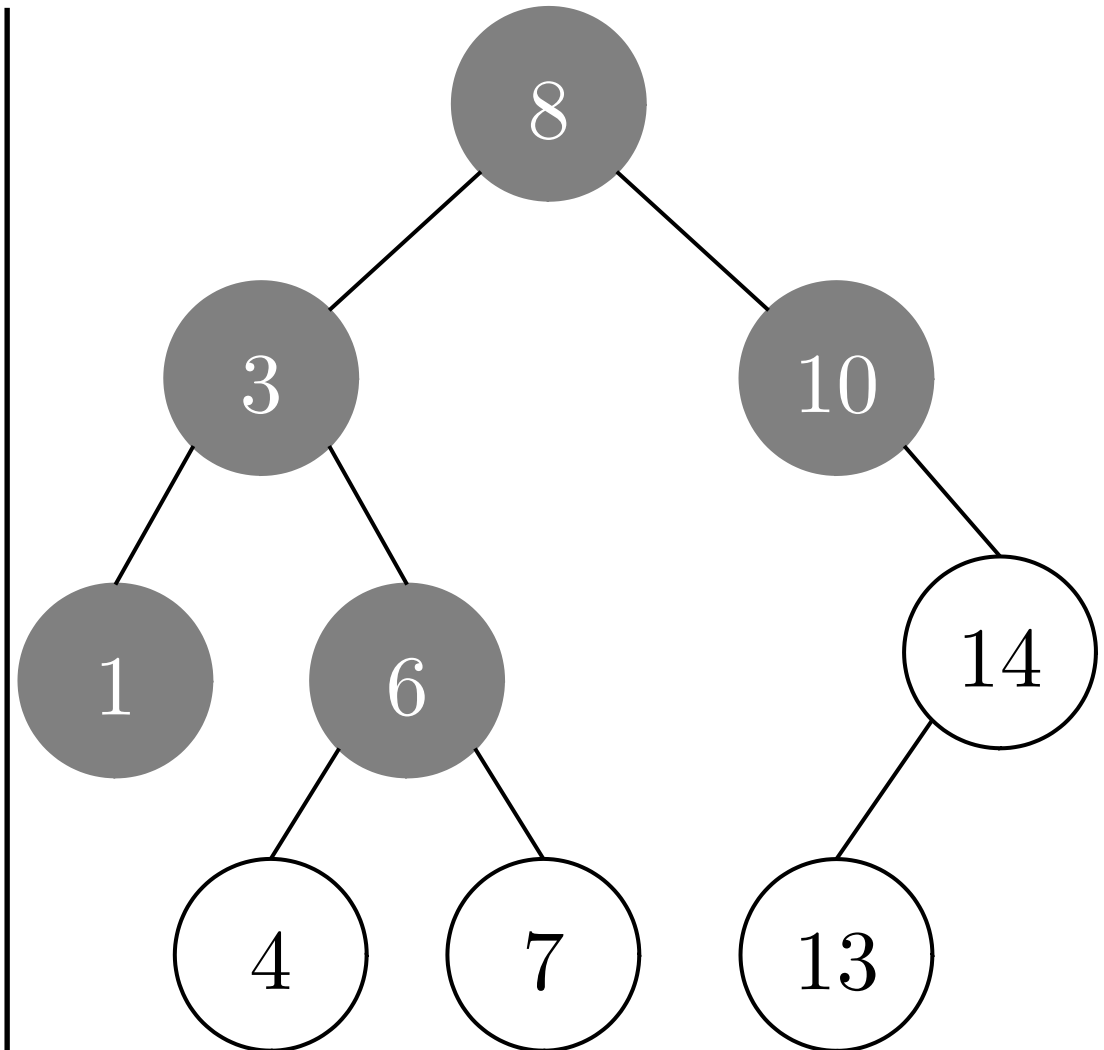
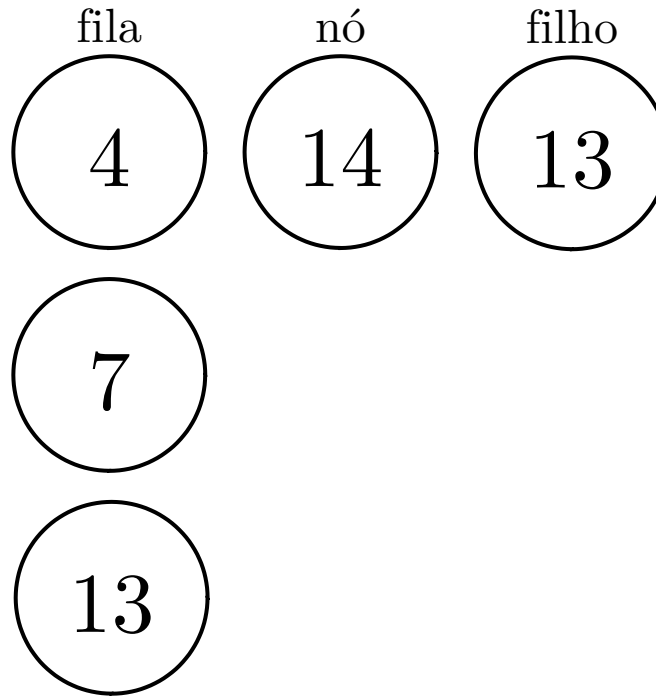
➡

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busca em largura

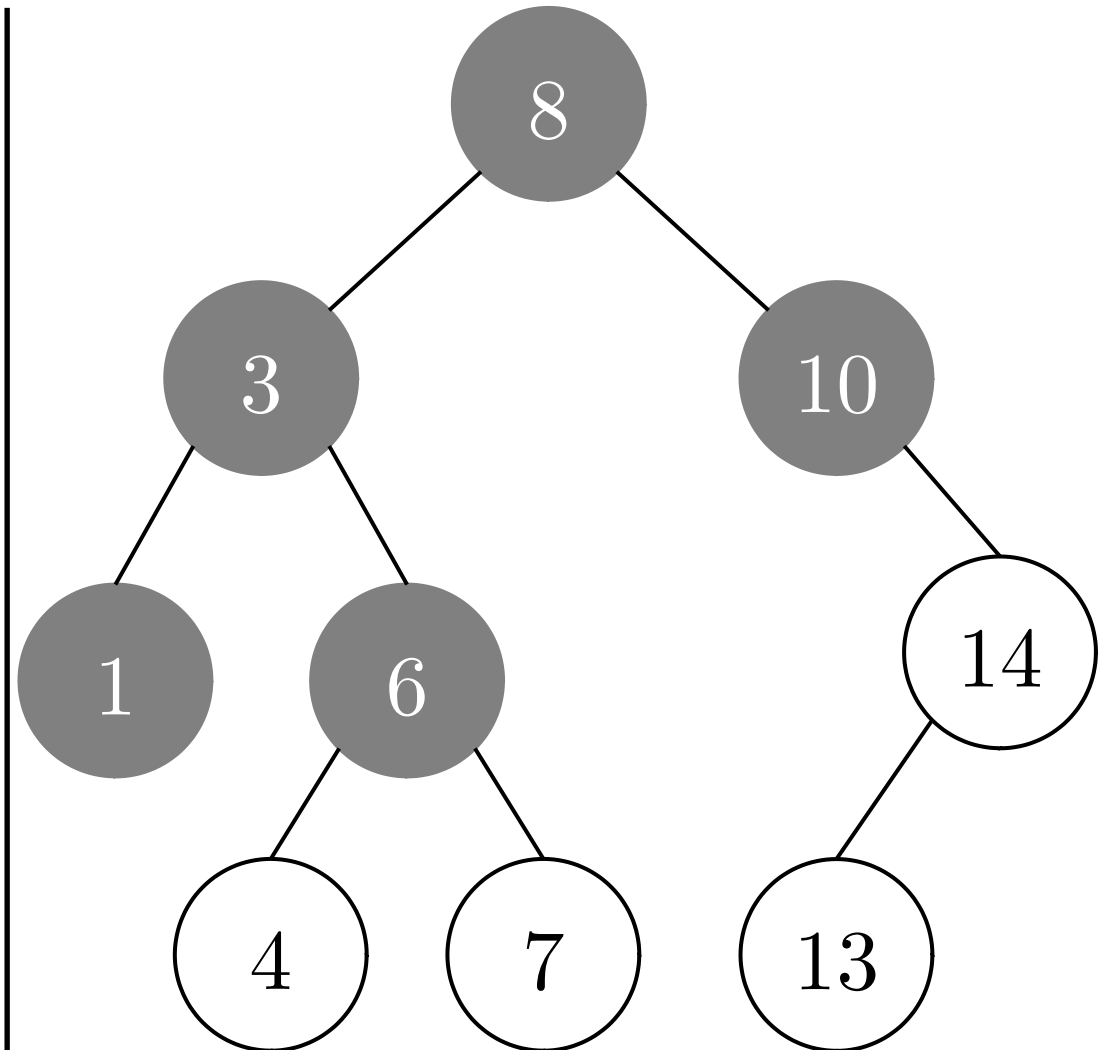
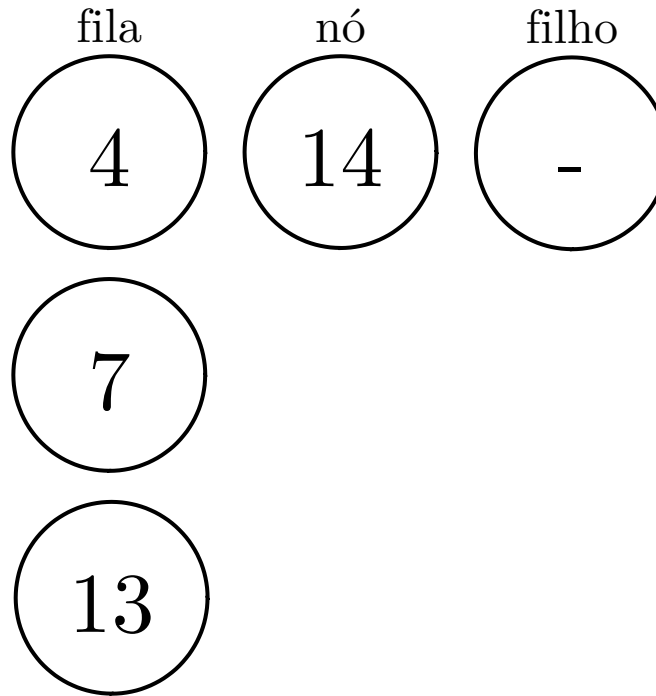
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busca em largura

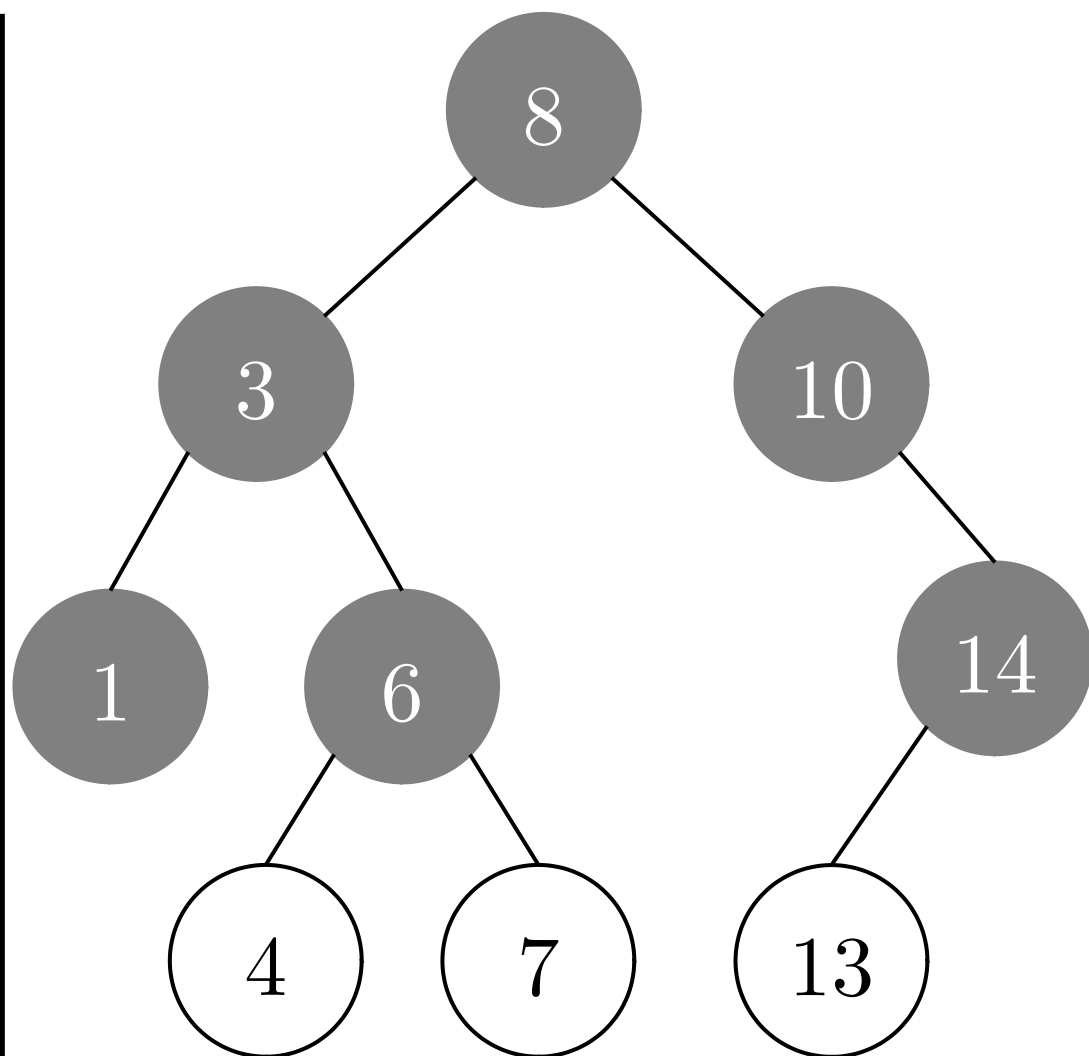
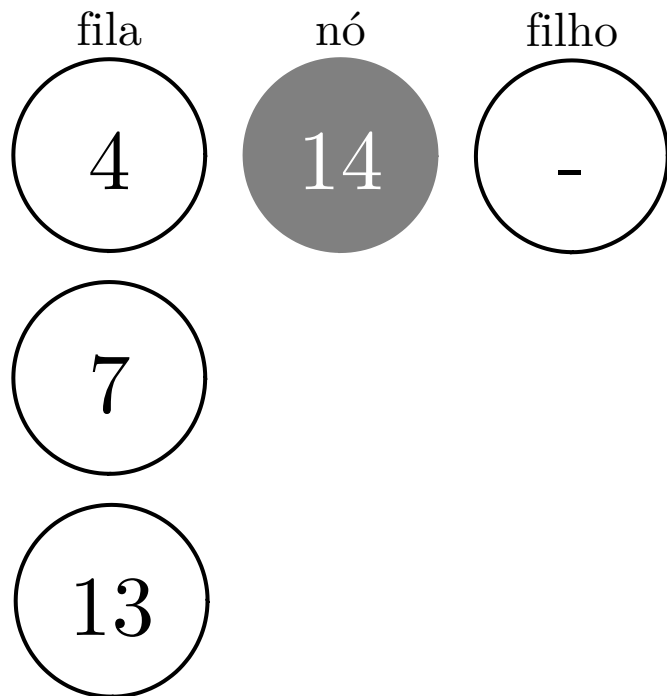
➔

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busca em largura

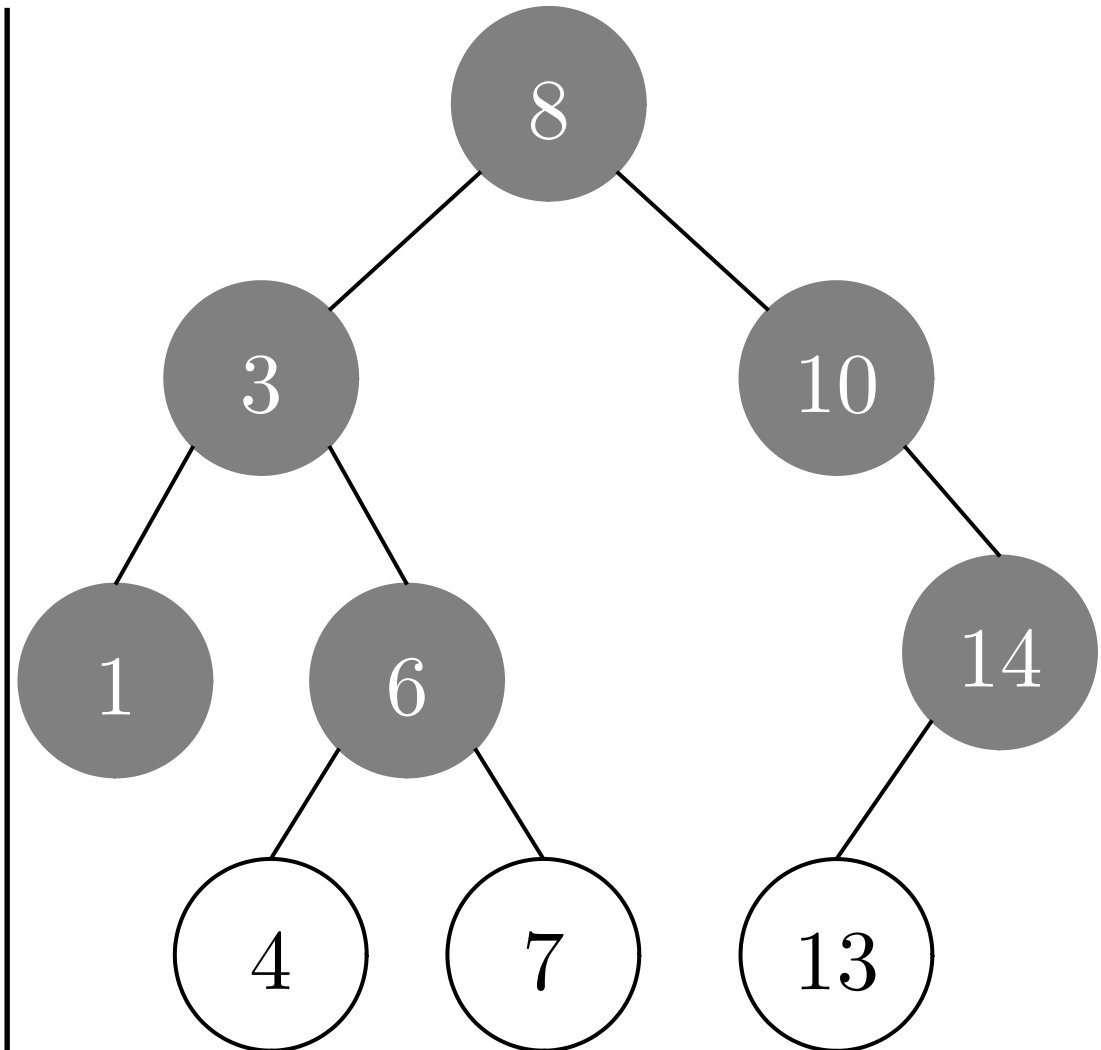
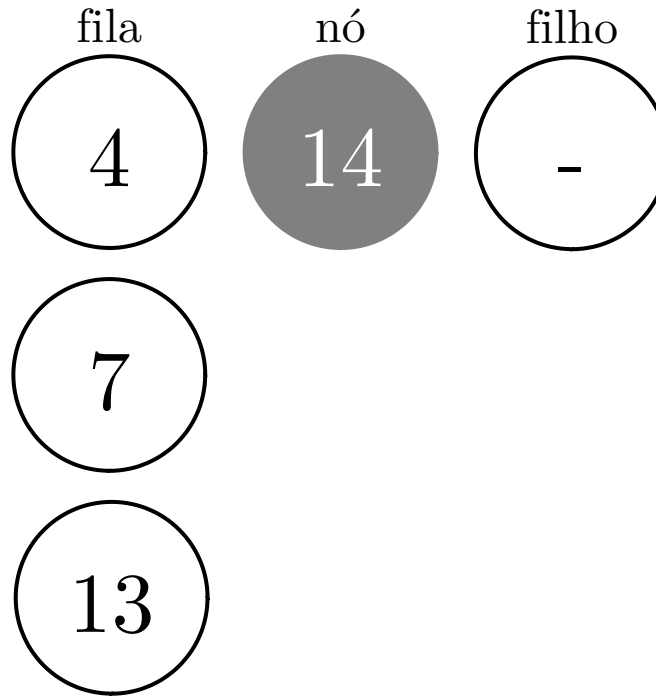
```
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busca em largura

➔

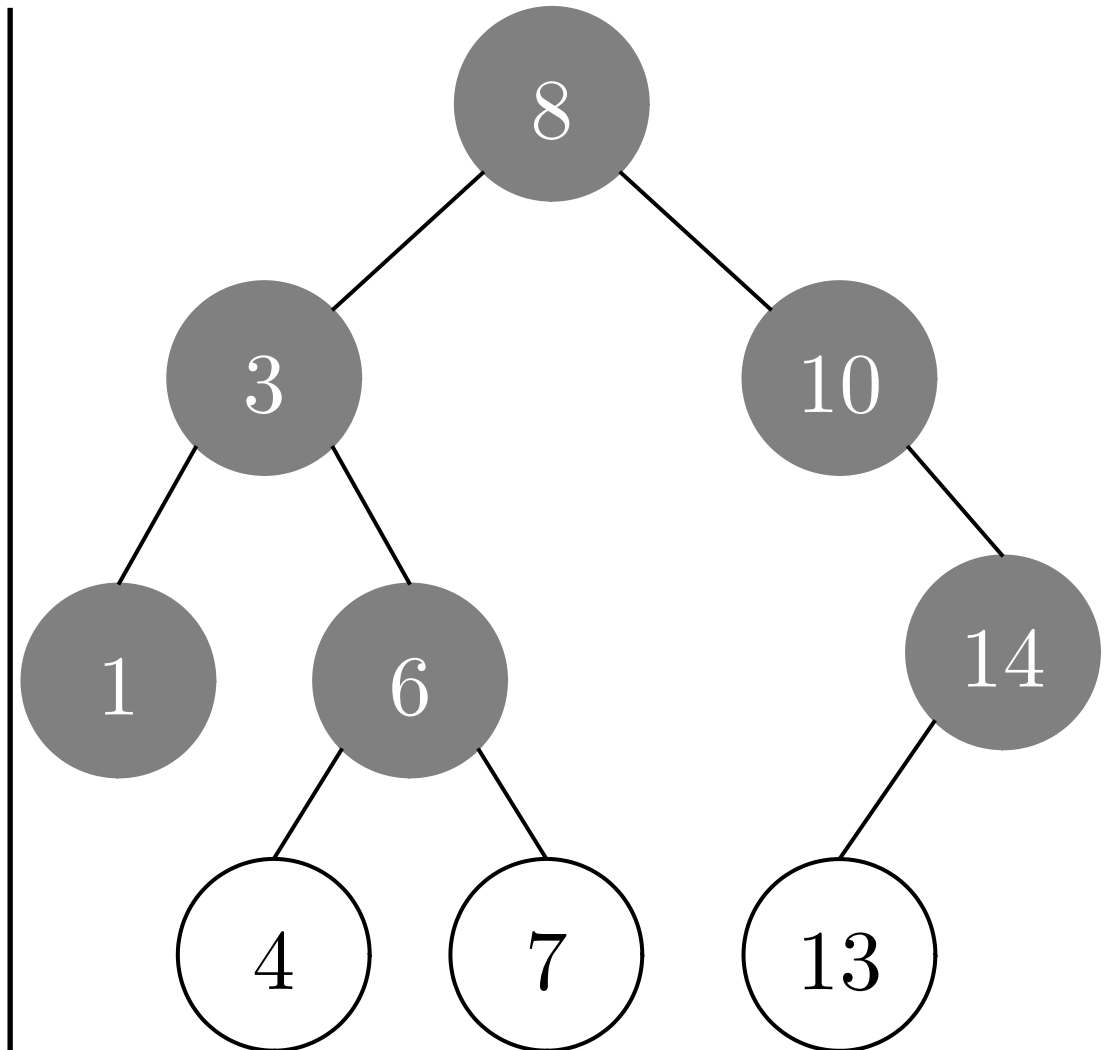
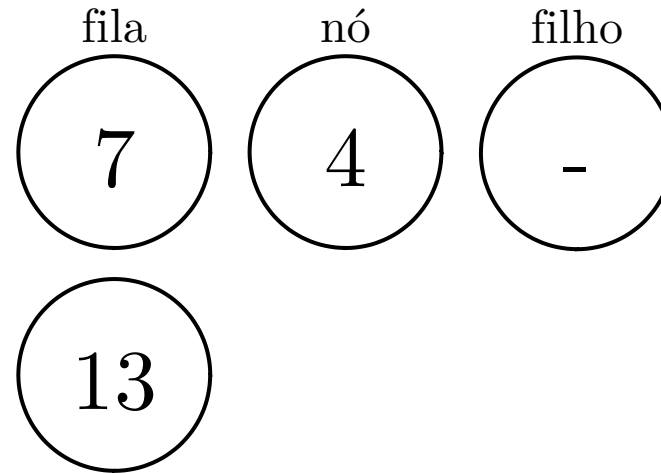
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busca em largura

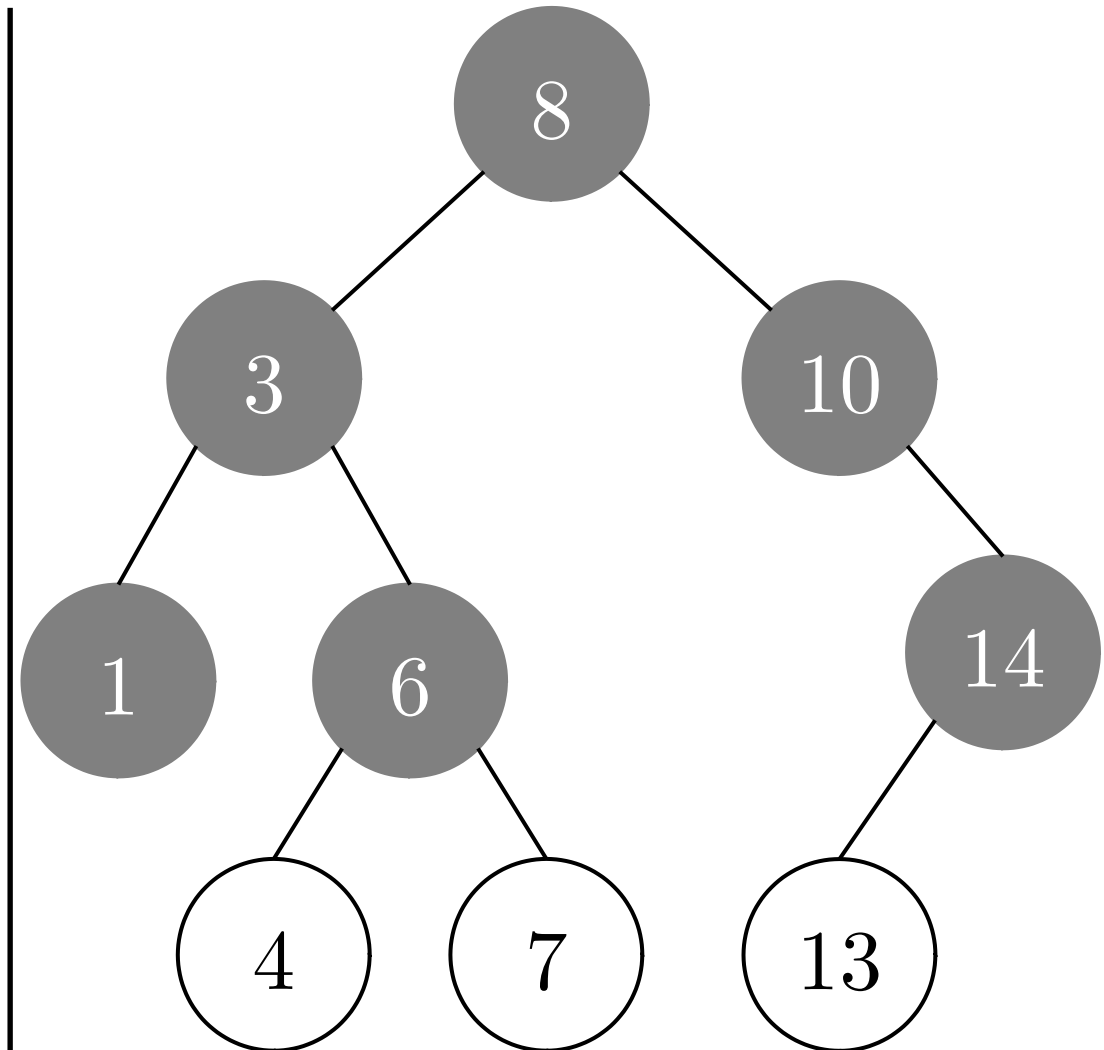
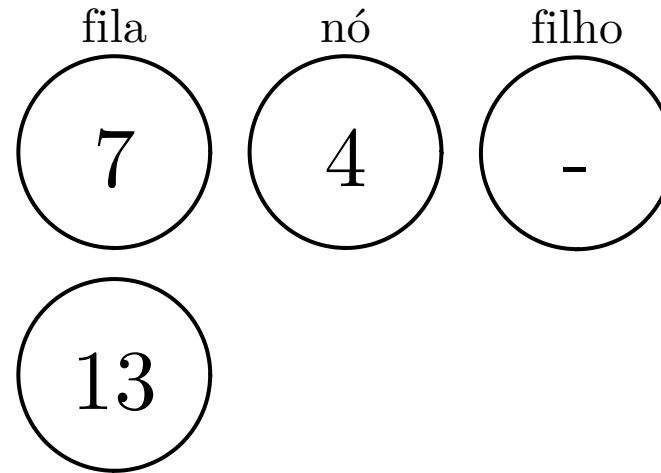
➔

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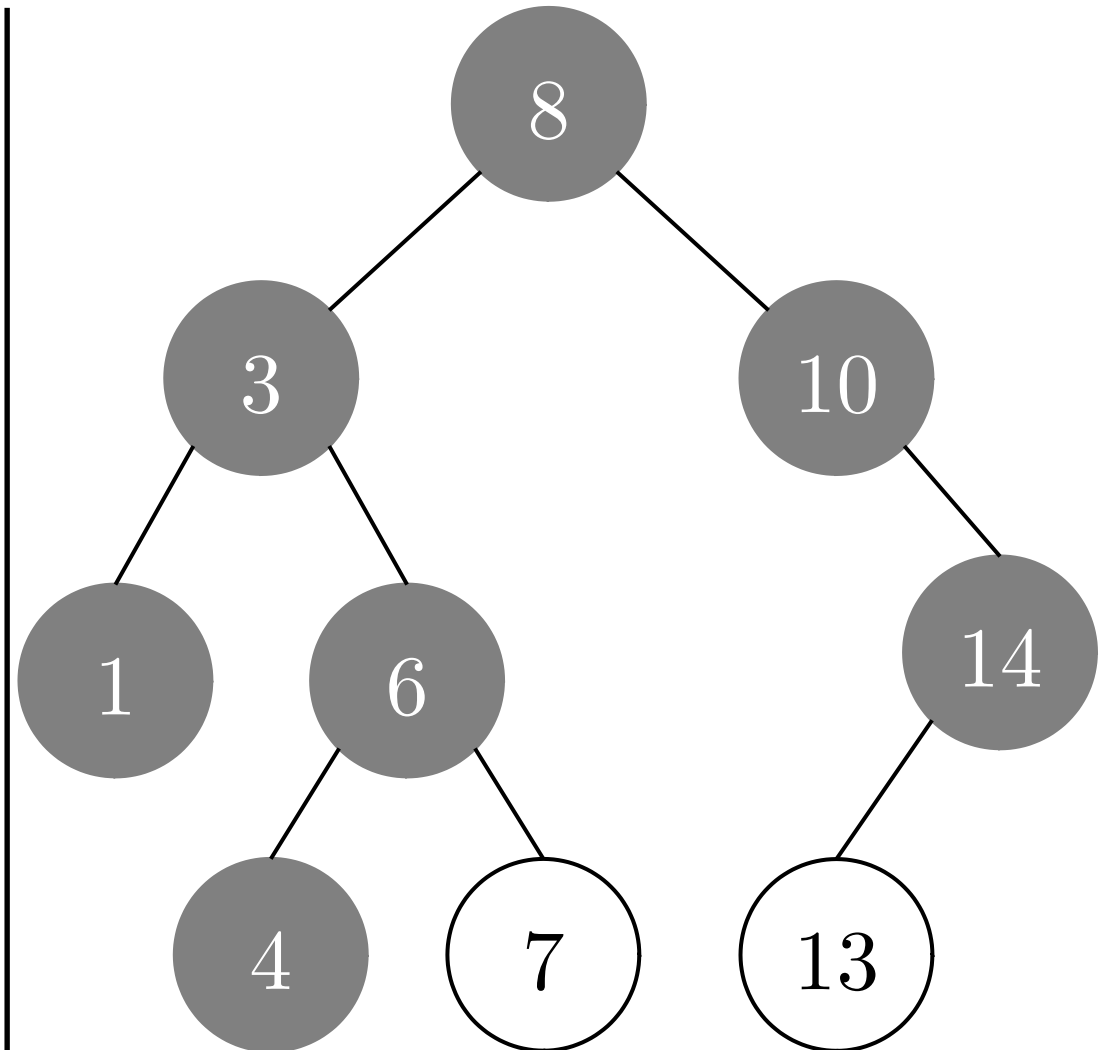
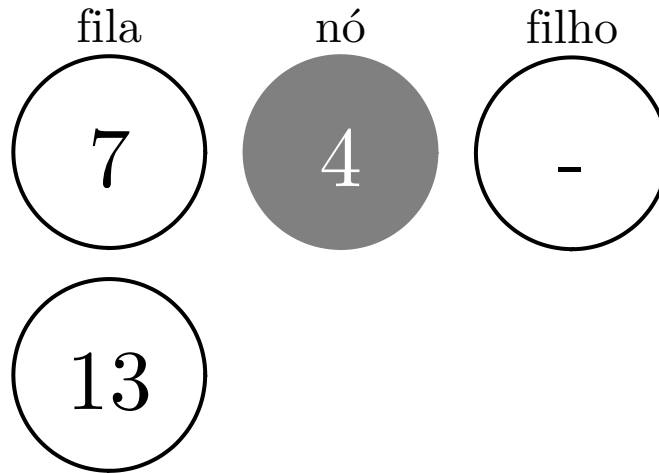
busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        → nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```



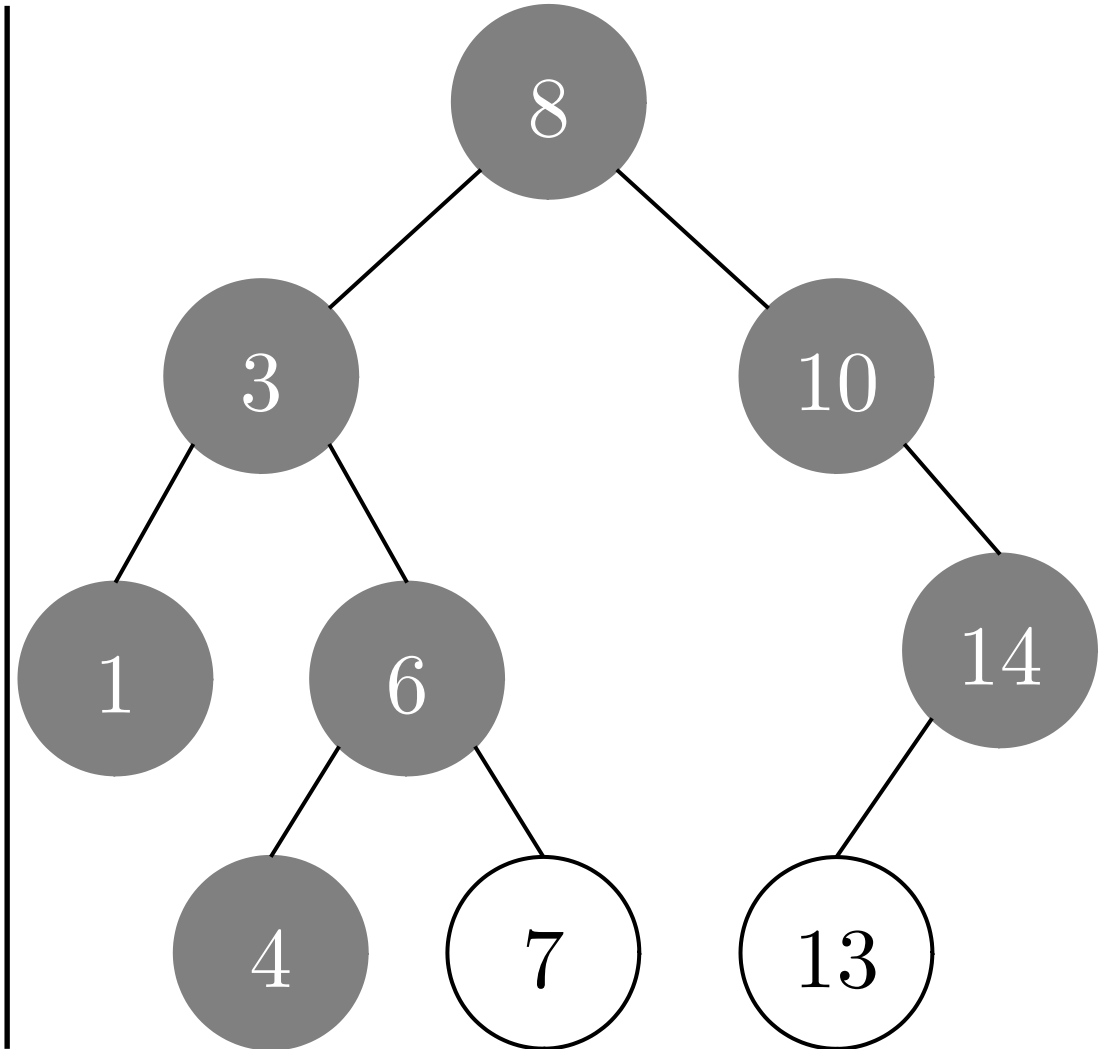
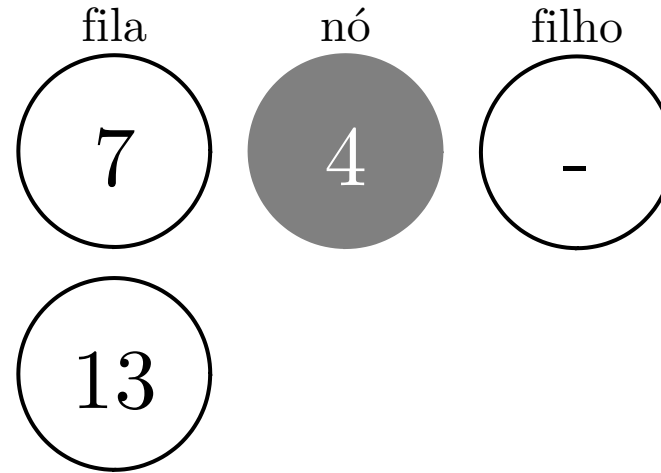
busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
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```



busca em largura

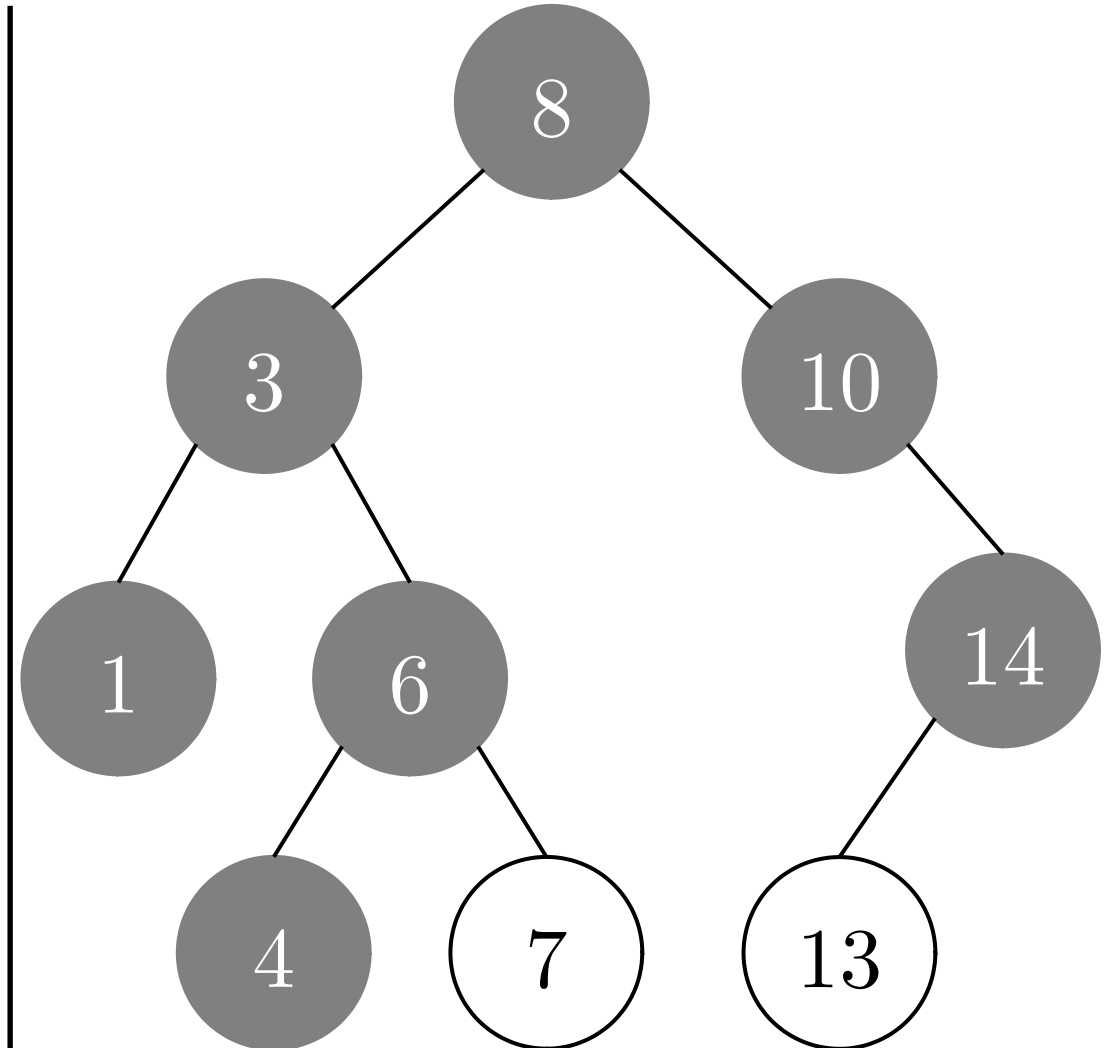
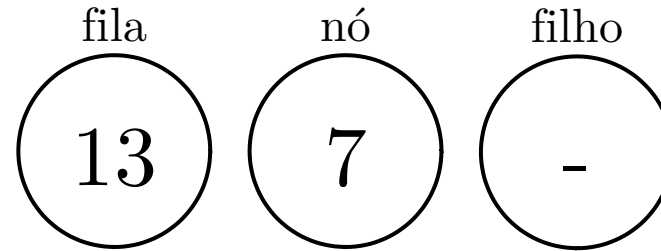
```
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    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
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```



busca em largura

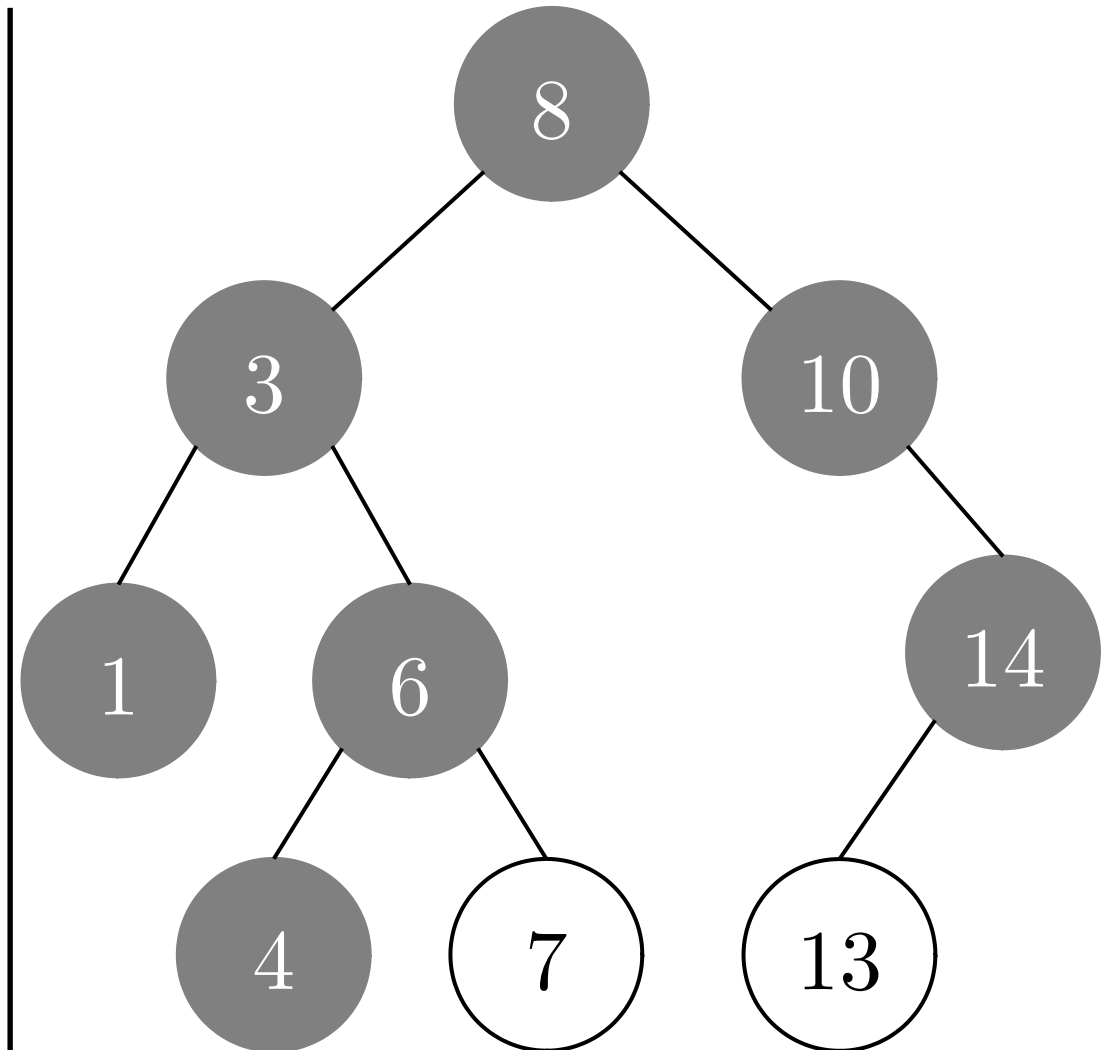
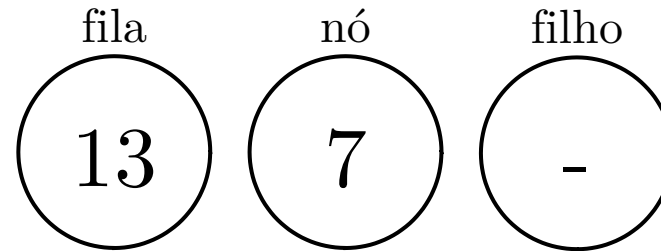
➔

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```



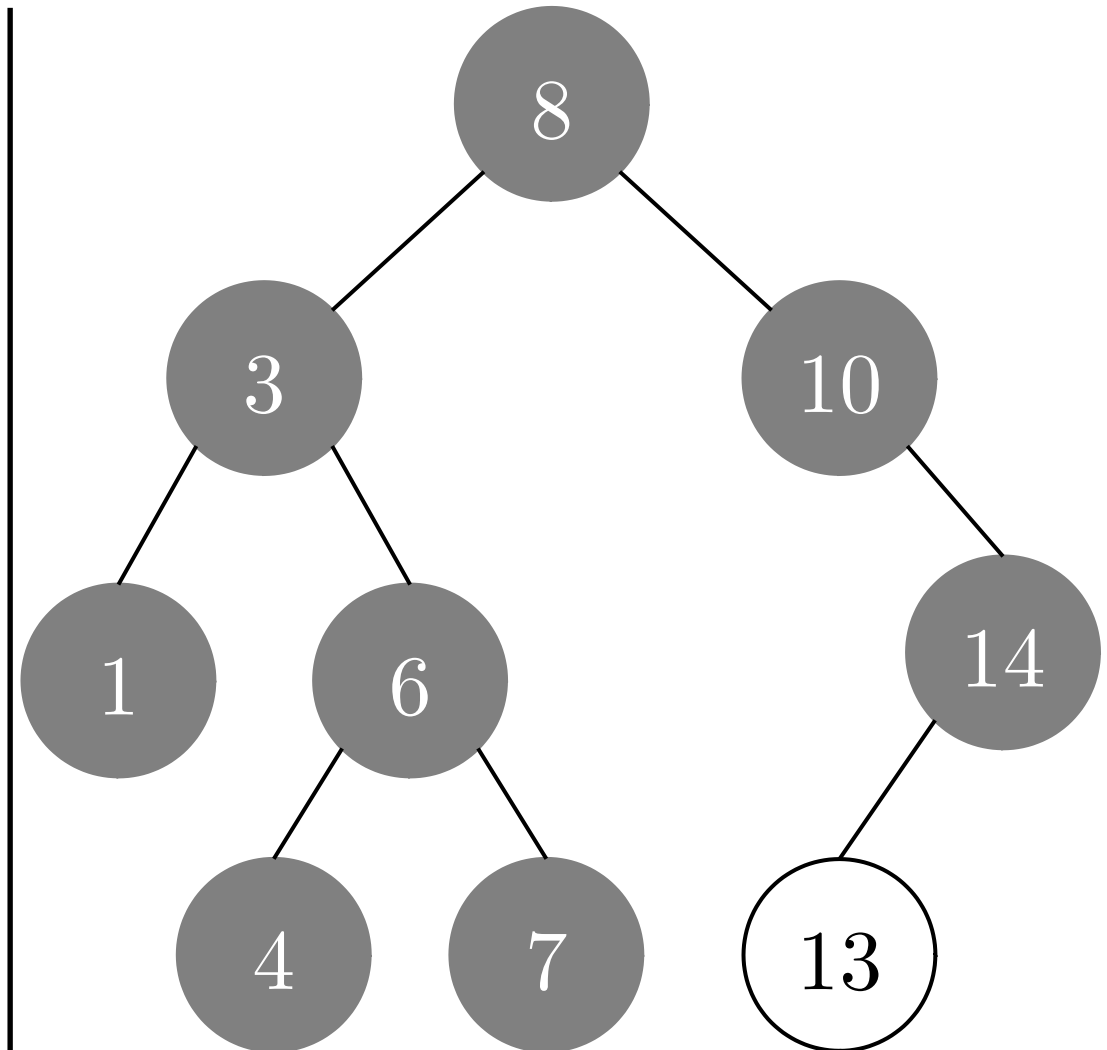
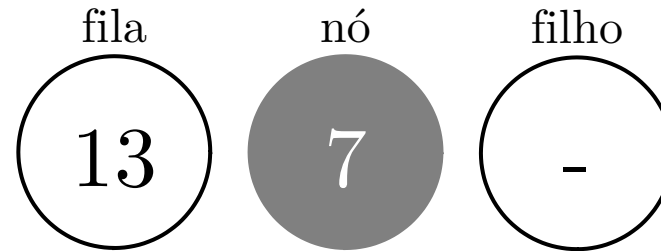
busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enfileirar(nó_inicial)  
    while (not fila.eh_vazia()):  
        nó = fila.desenfileirar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                fila.enfileirar(filho)  
        nó.visitado = True
```



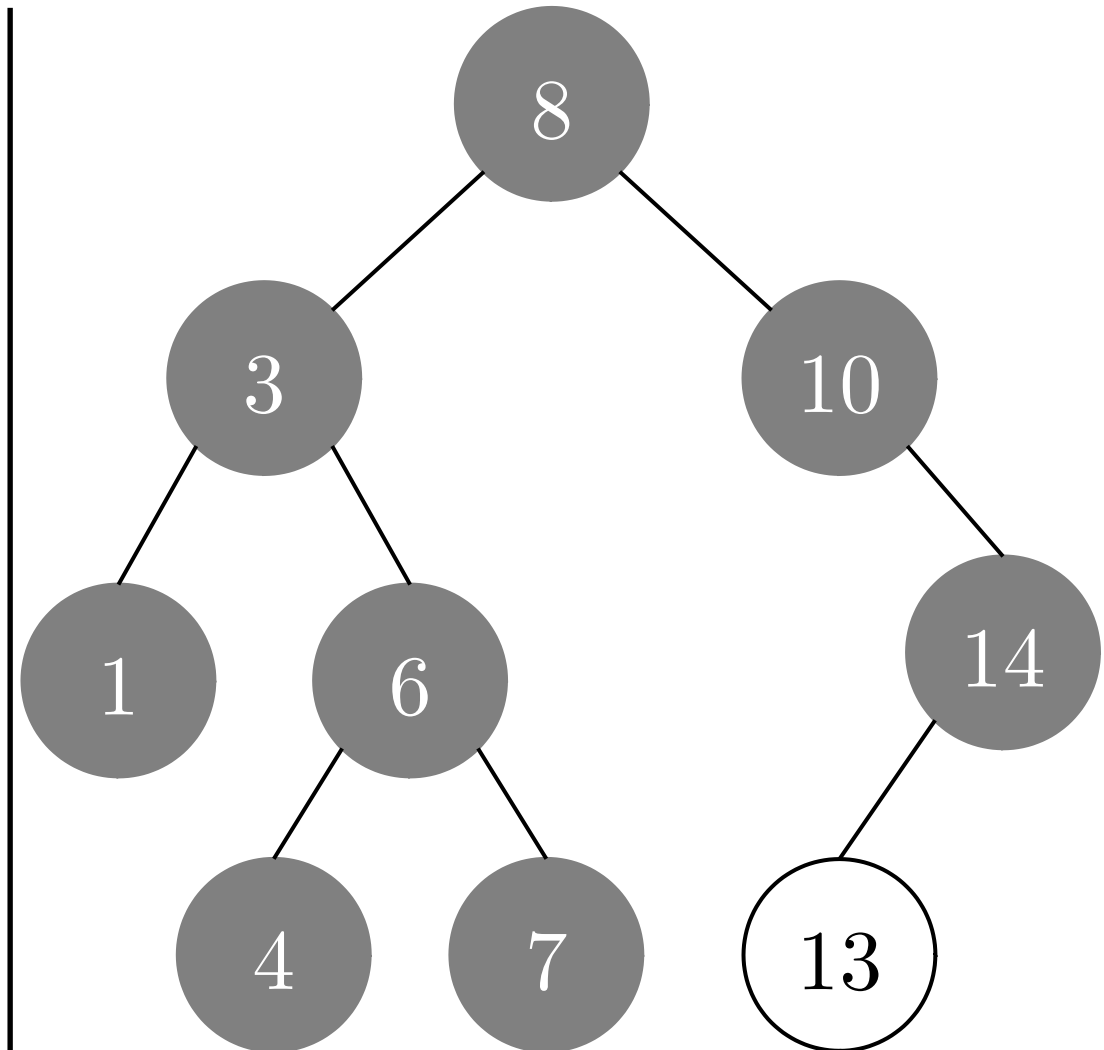
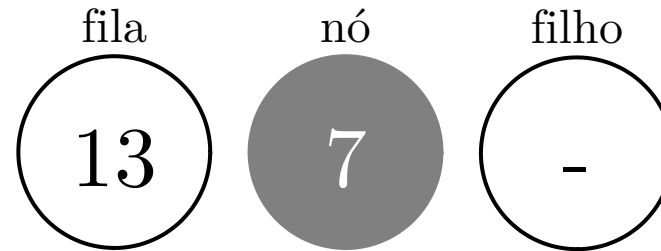
busca em largura

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            if (not filho.visited):  
                fila.enqueue(filho)  
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busca em largura

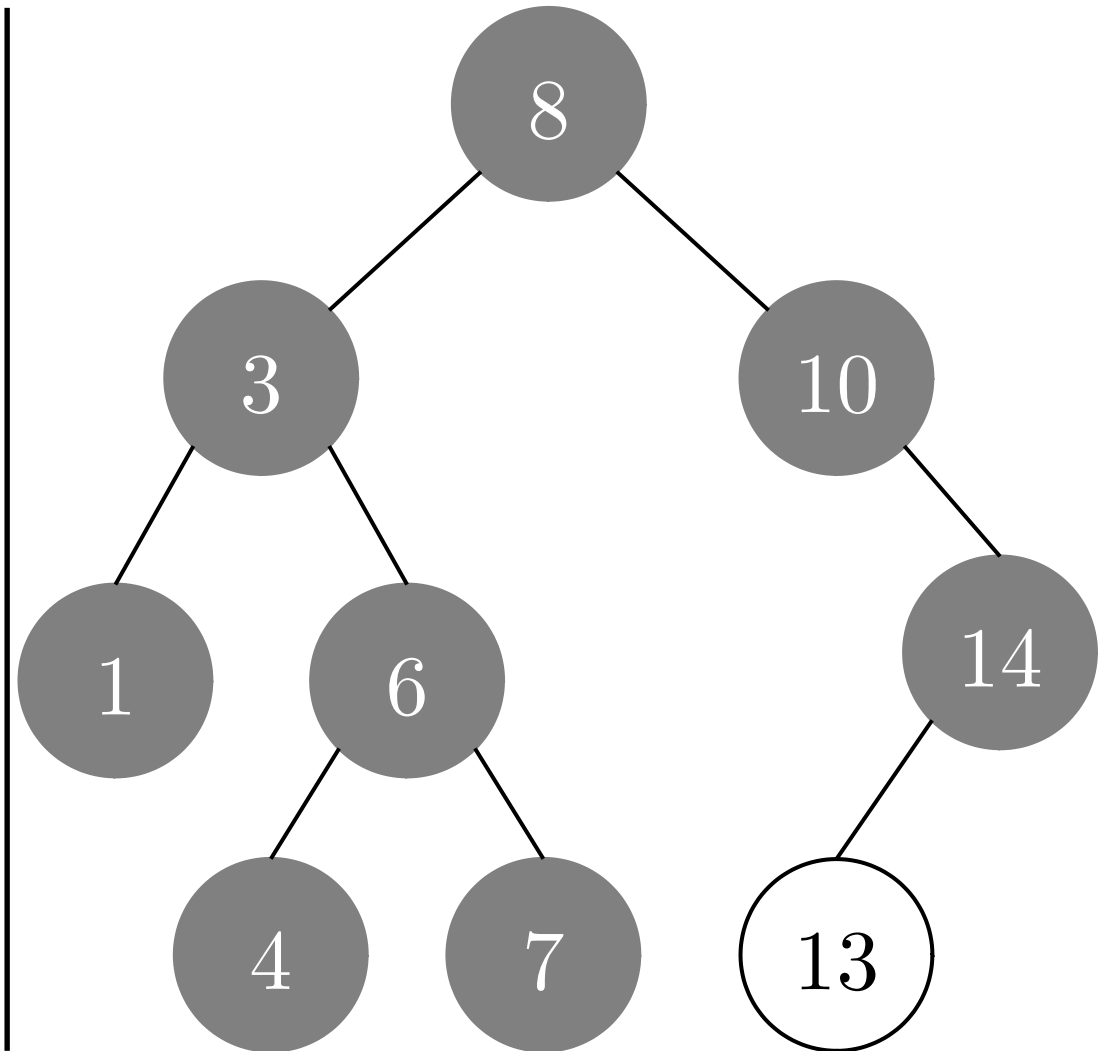
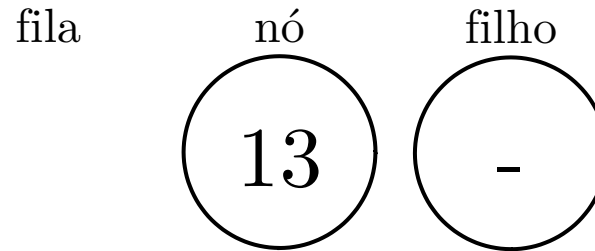
```
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    fila = Fila()  
    fila.enqueue(nó_inicial)  
    ➔ while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
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busca em largura

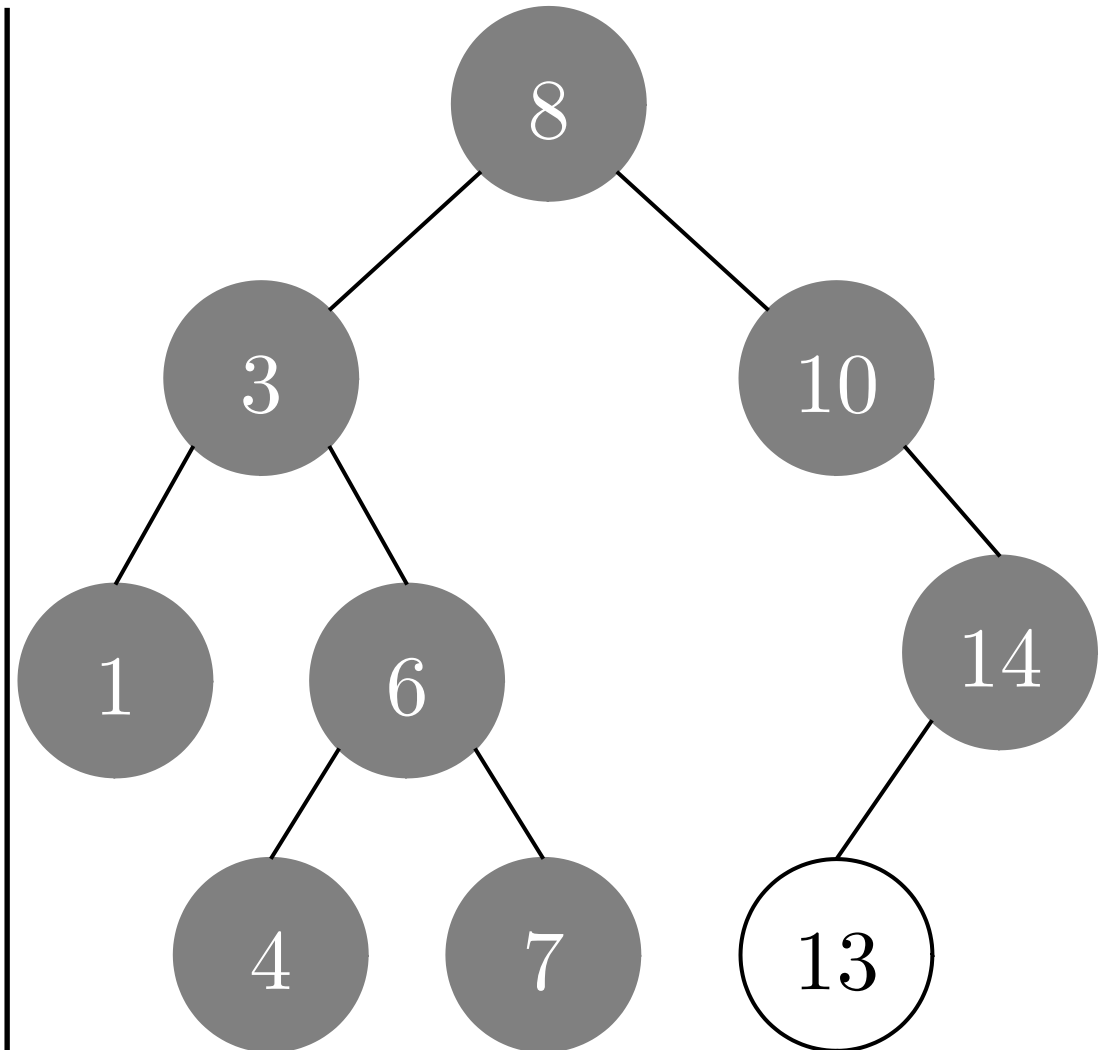
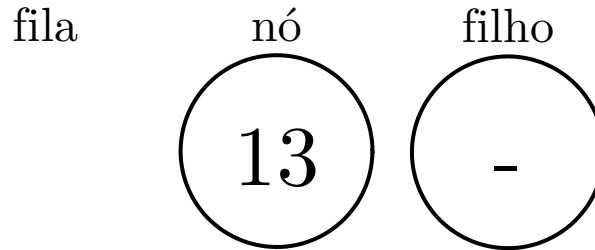
➔

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    fila.enqueue(nó_inicial)  
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                fila.enqueue(filho)  
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busca em largura

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            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```



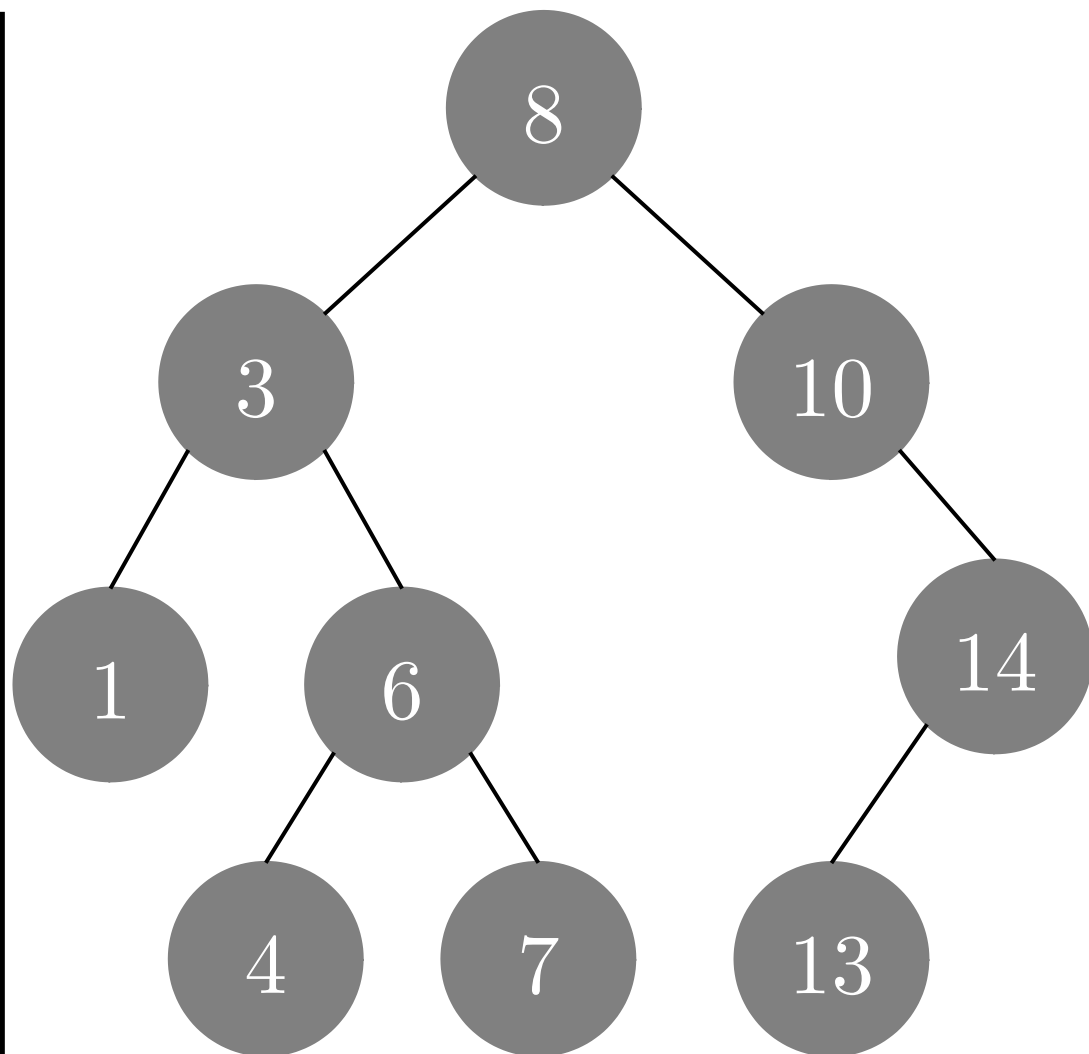
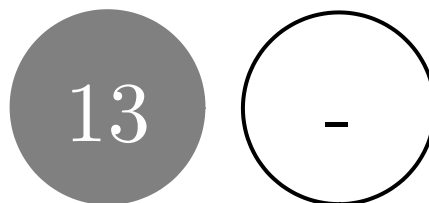
busca em largura

```
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    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```

fila

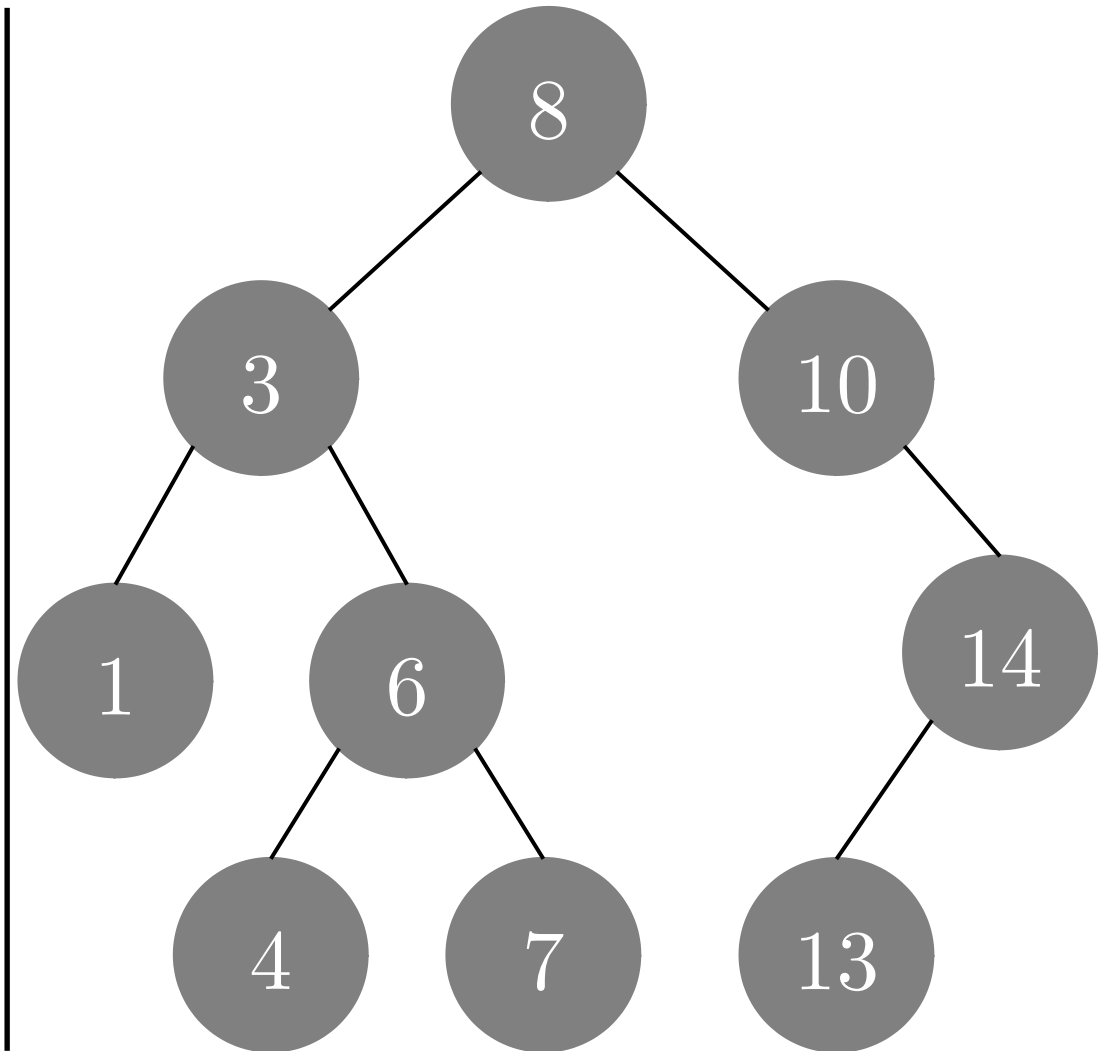
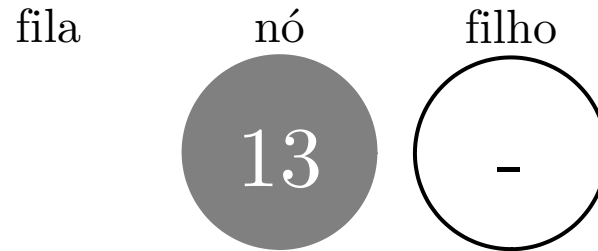
nó

filho



busca em largura

```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    ➔ while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
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                fila.enqueue(filho)  
        nó.visited = True
```



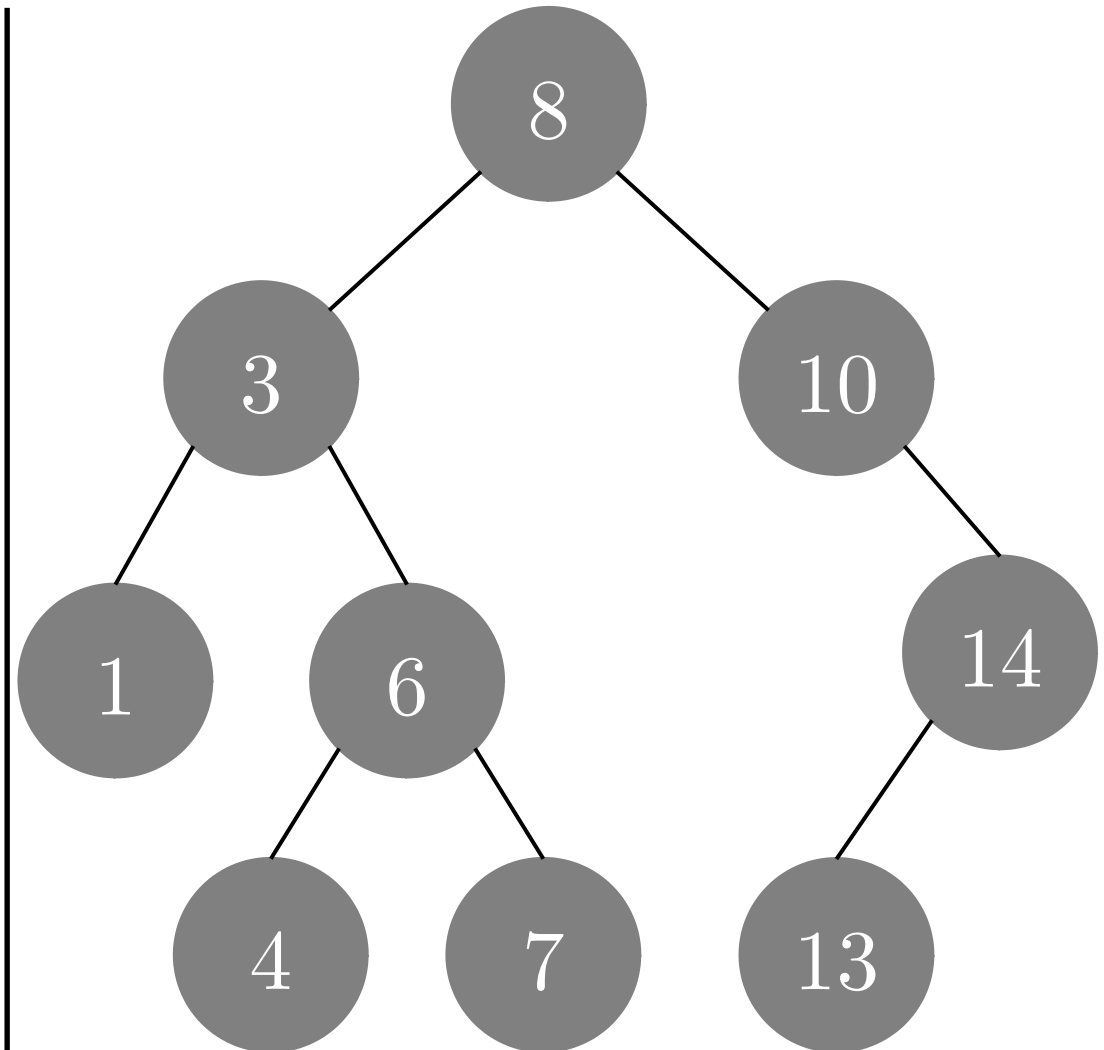
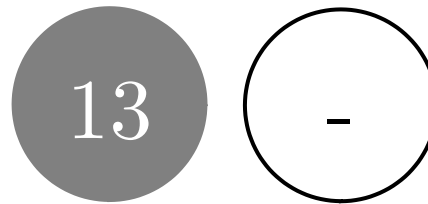
busca em largura

```
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    fila = Fila()  
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    while (not fila.is_empty()):  
        nó = fila.dequeue()  
        for filho in nó.children():  
            if (not filho.visited):  
                fila.enqueue(filho)  
        nó.visited = True
```

fila

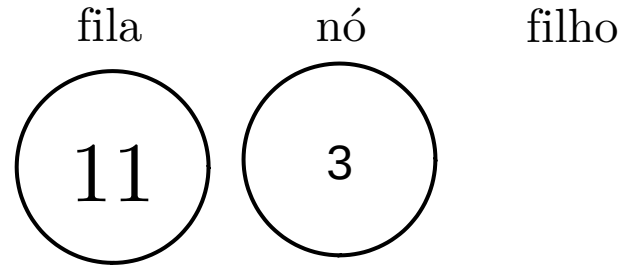
nó

filho

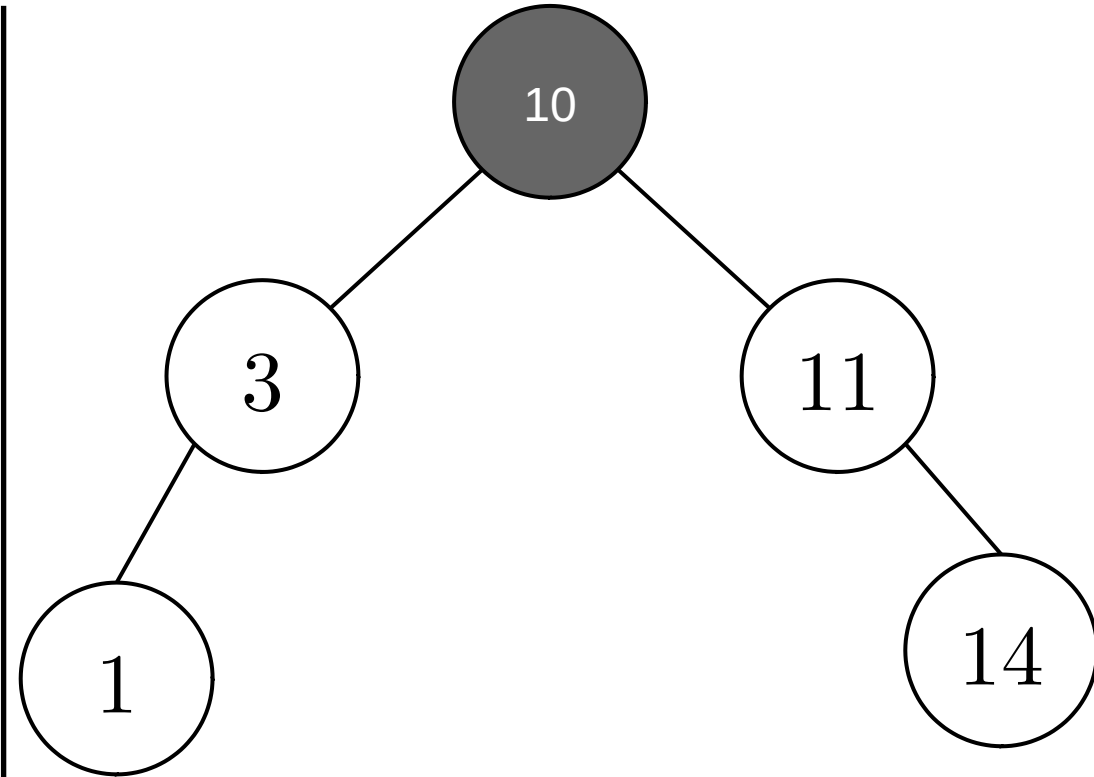


exercícios

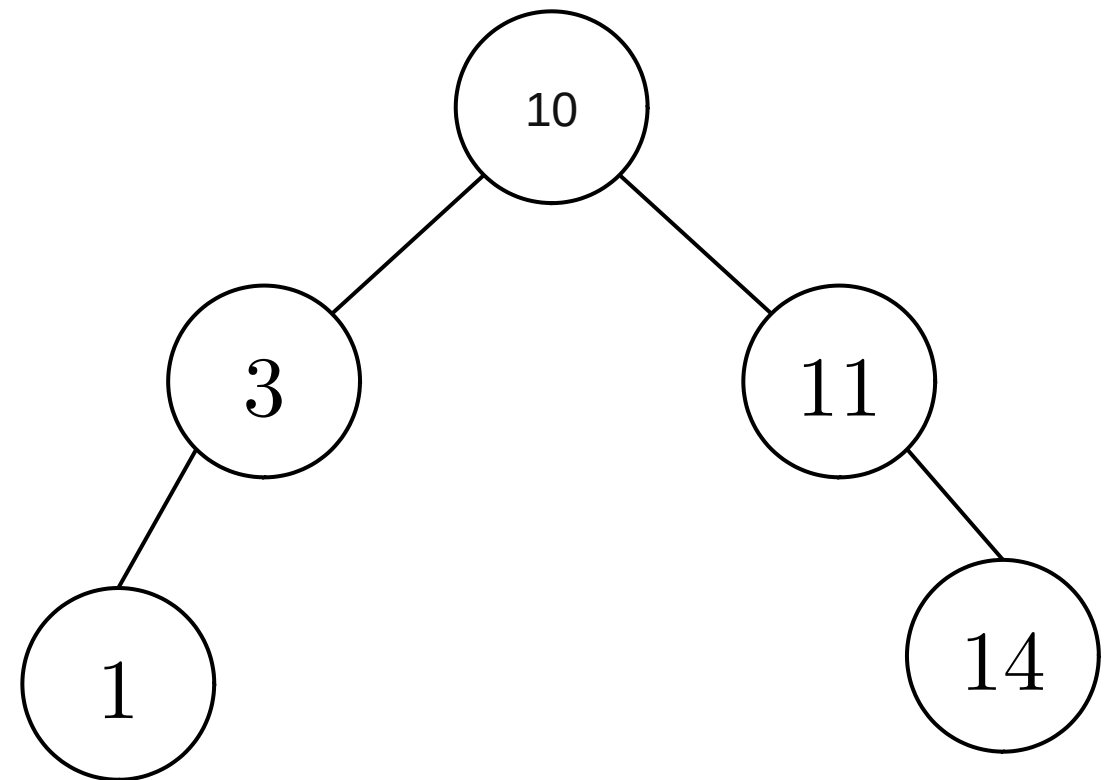
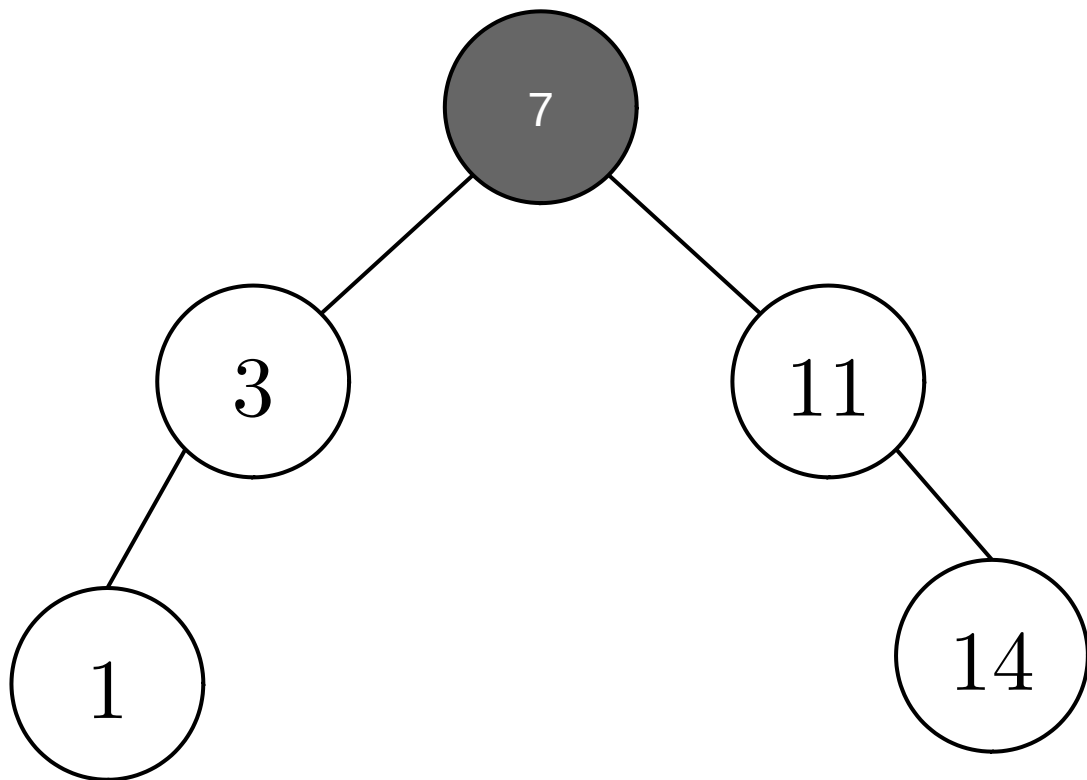
exercício



```
def bfs(nó_inicial):  
    fila = Fila()  
    fila.enqueue(nó_inicial)  
    while (not fila.is_empty()):  
        → nó = fila.dequeue()  
        for filho in nó.children():  
            fila.enqueue(filho)  
        nó.visited = True
```



exercício



busca em profundidade

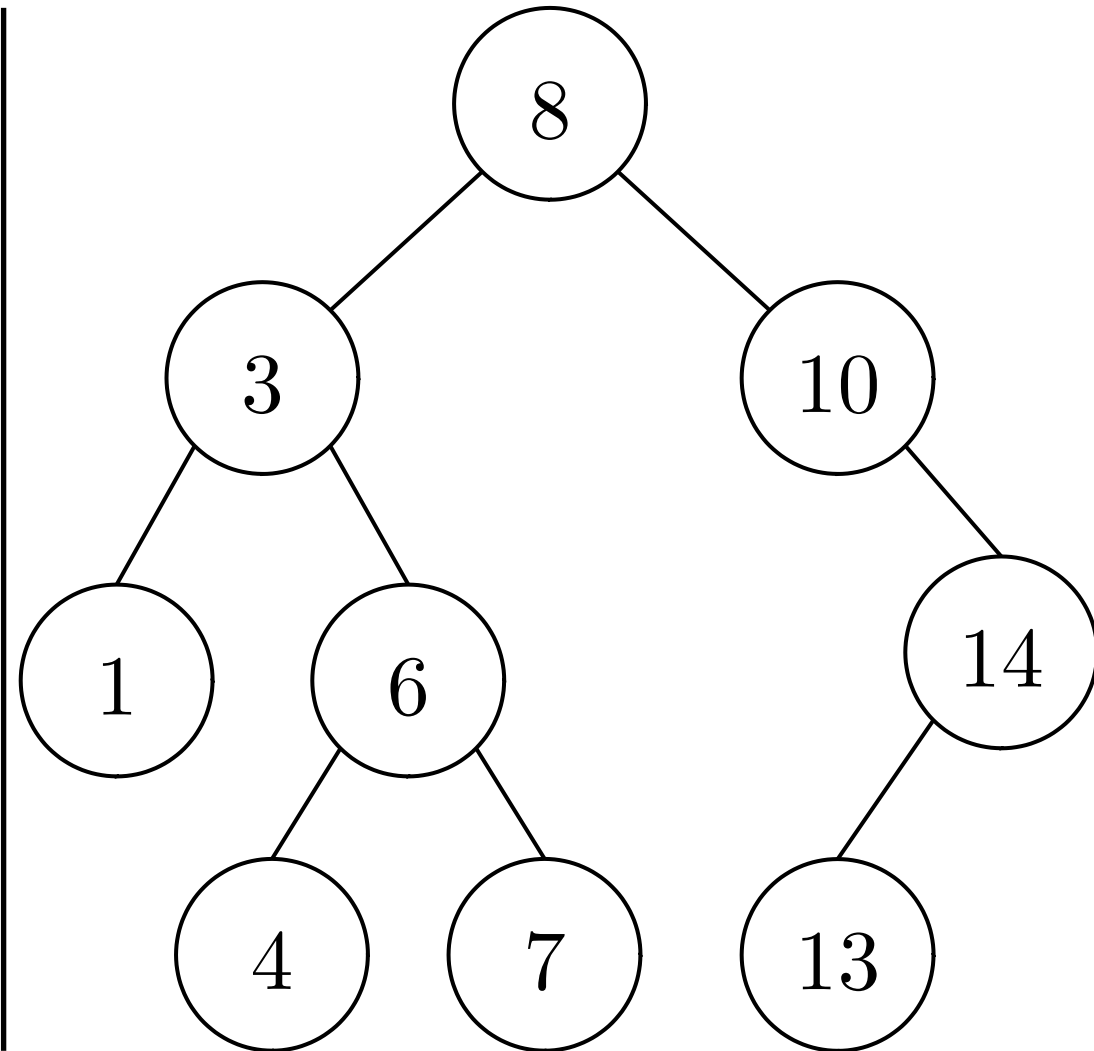
busca em profundidade

```
➡def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```

pilha

nó

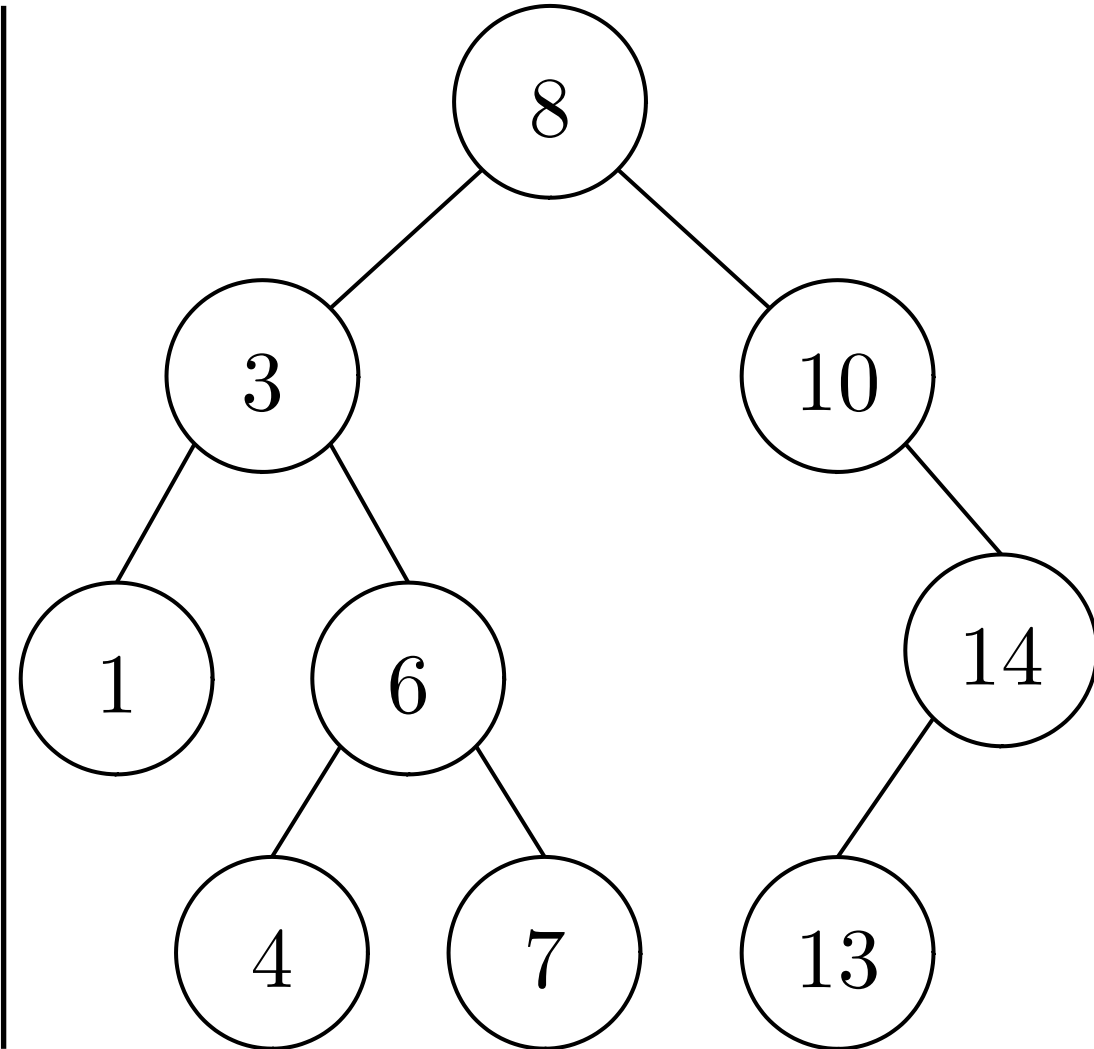
filho



busca em profundidade

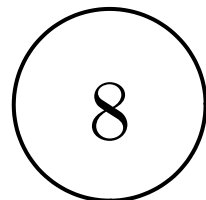
```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```

pilha

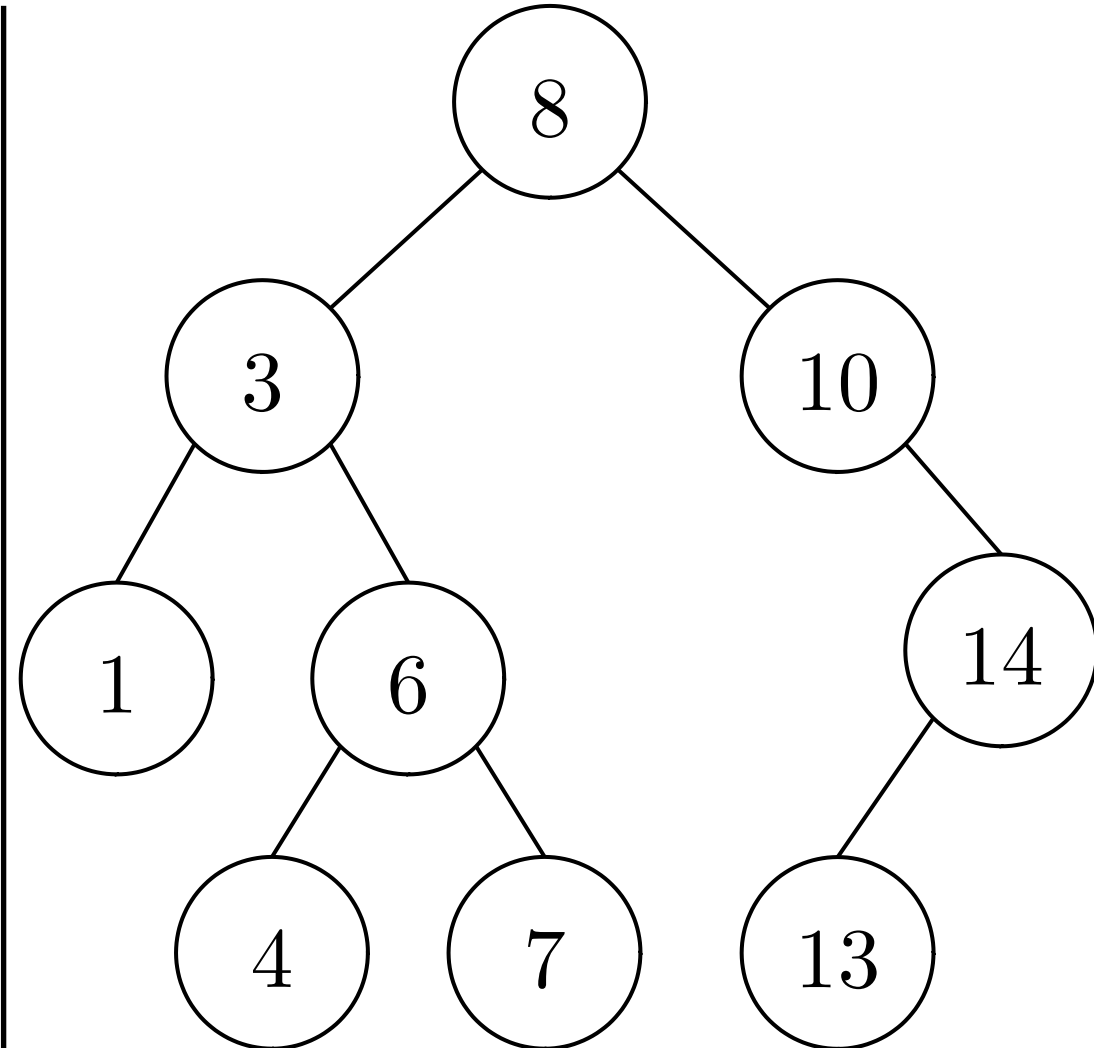


busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
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```

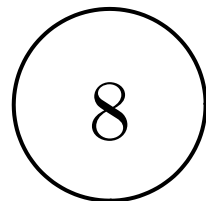


pilha

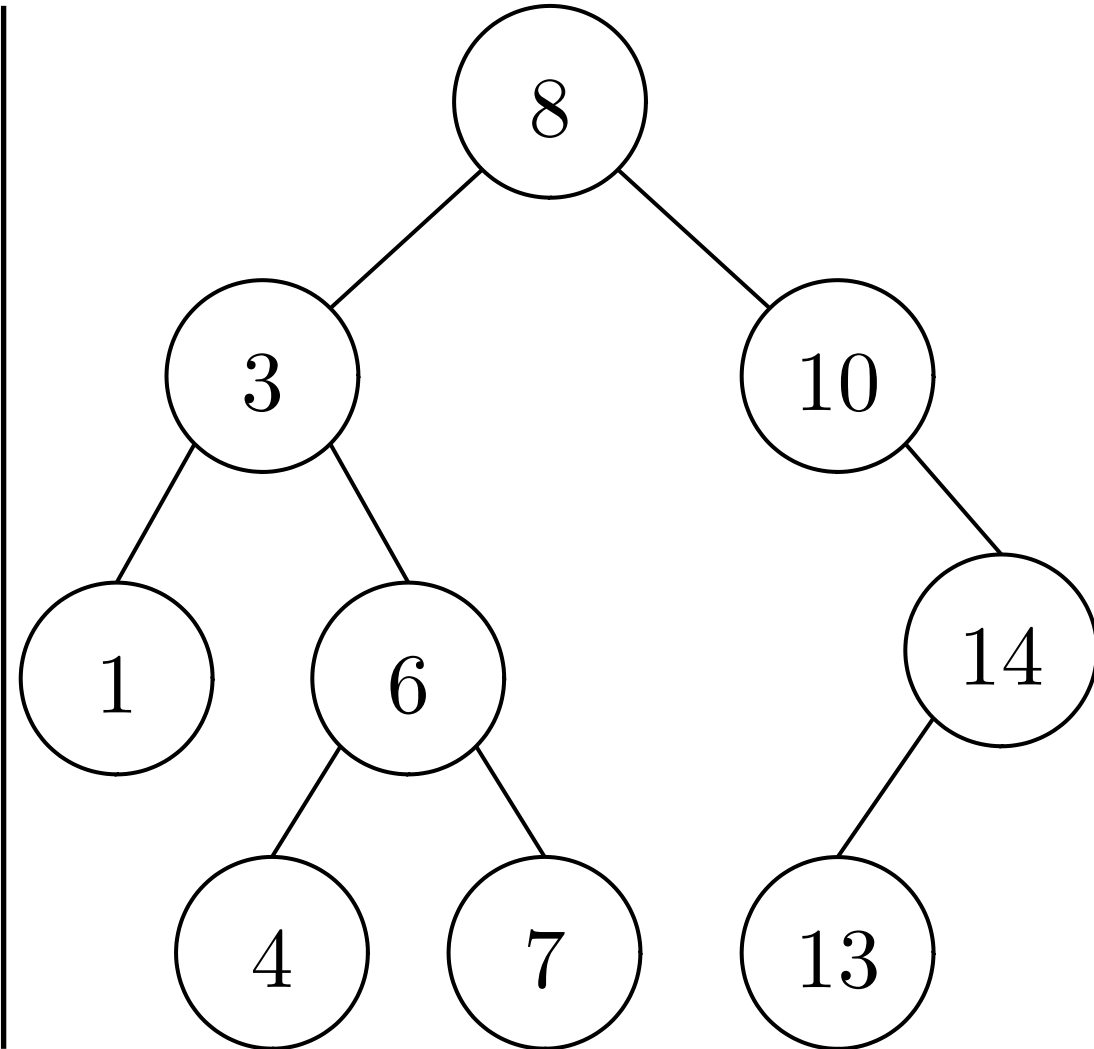


busca em profundidade

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```



pilha

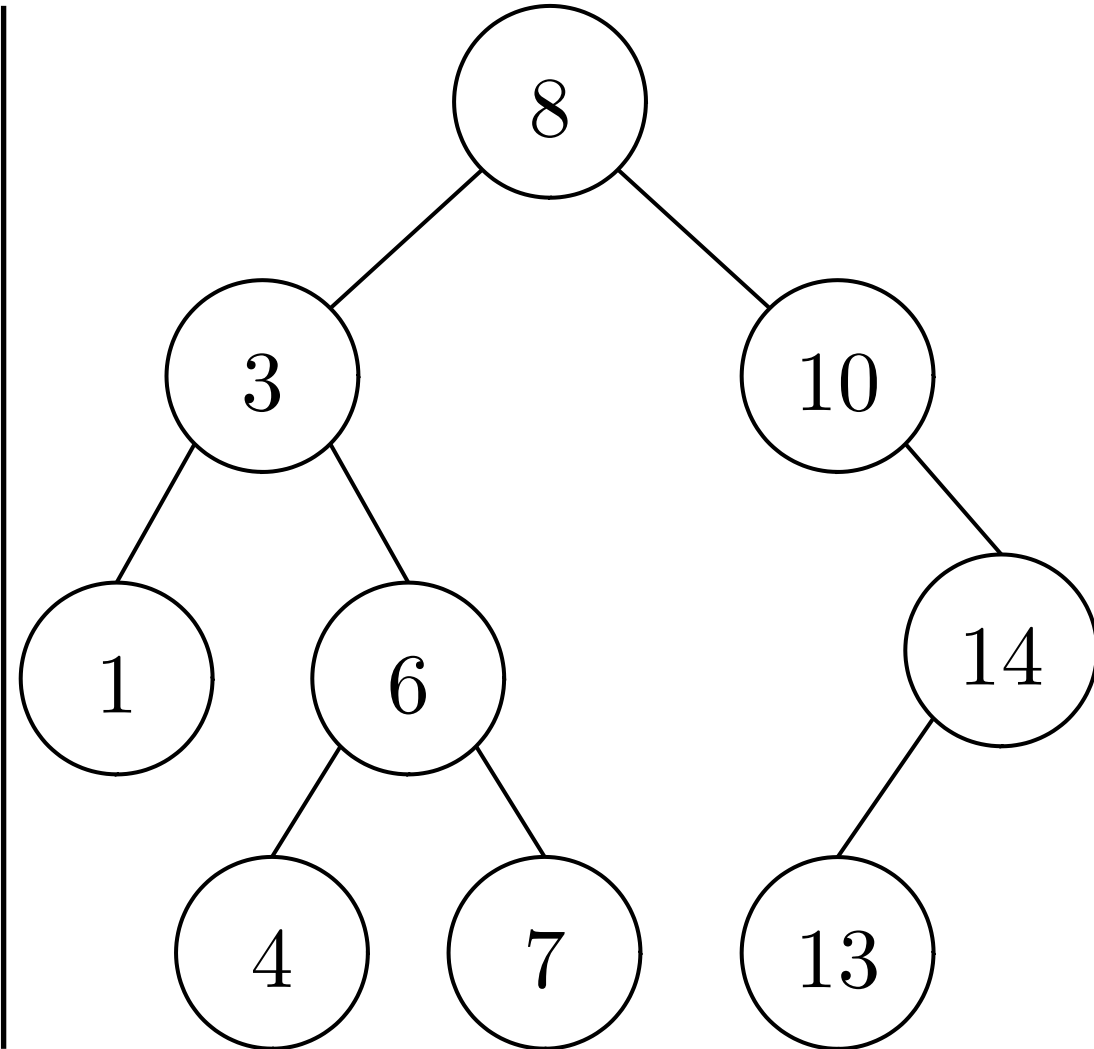


busca em profundidade

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            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```

pilha

nó



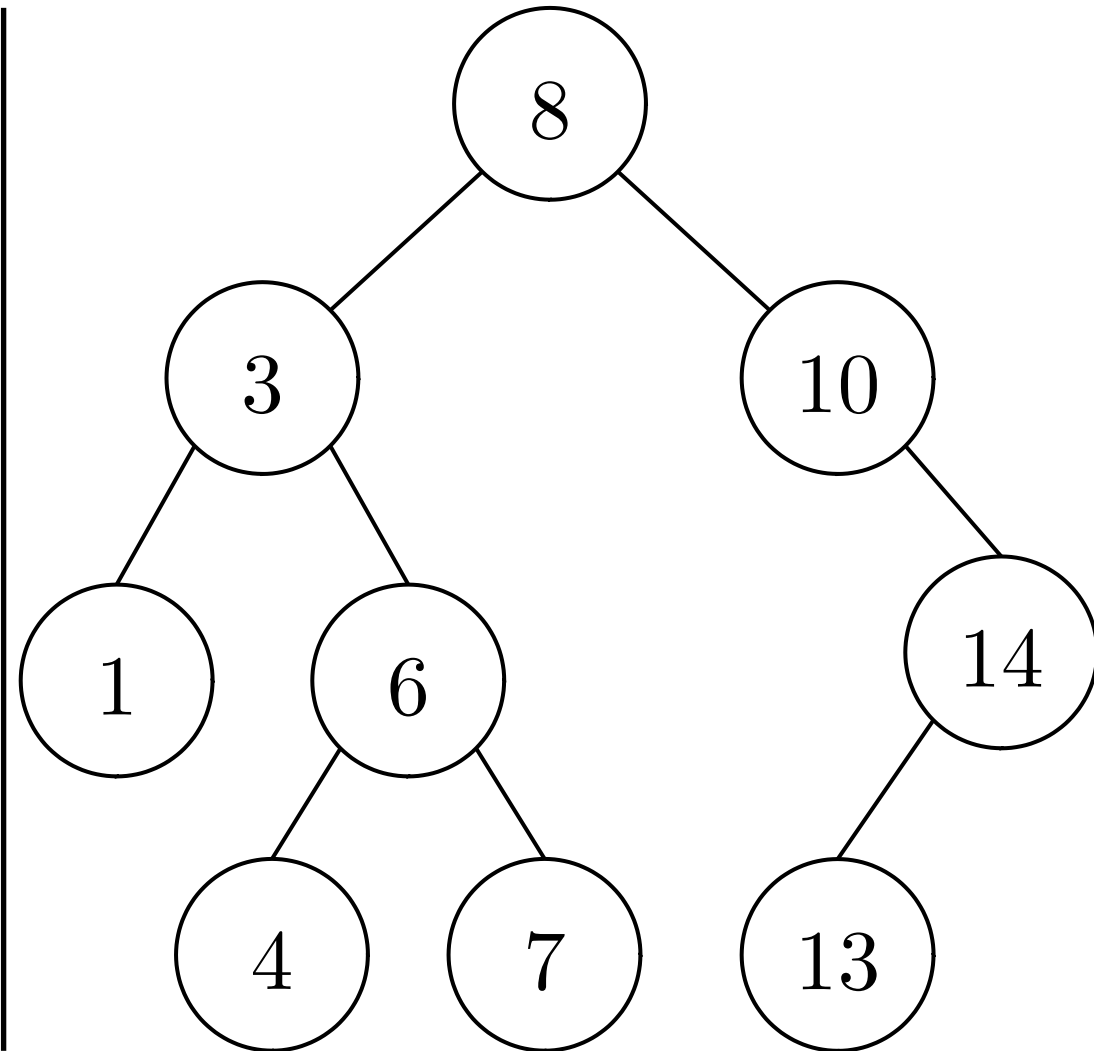
busca em profundidade

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pilha

nó

filho



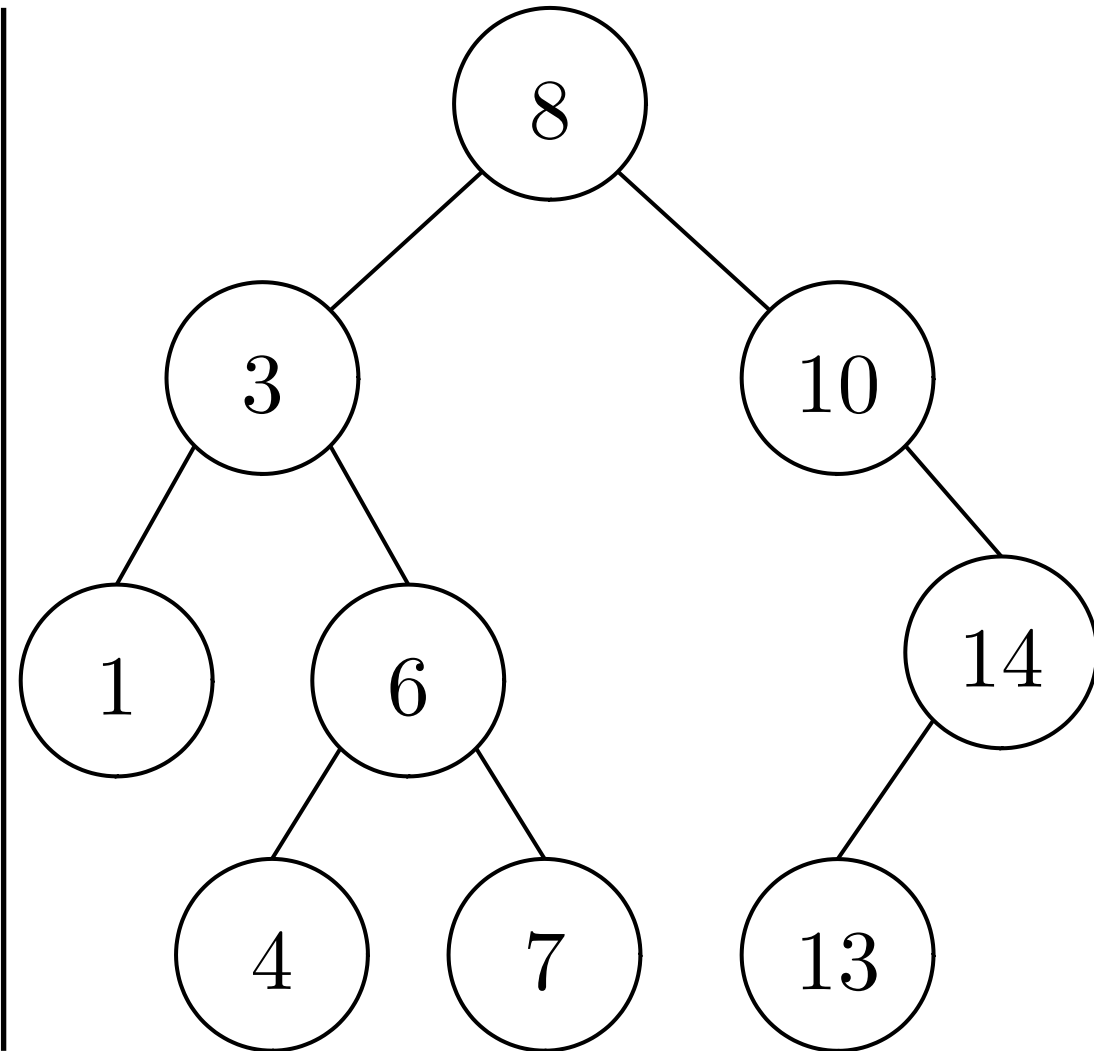
busca em profundidade

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```

pilha

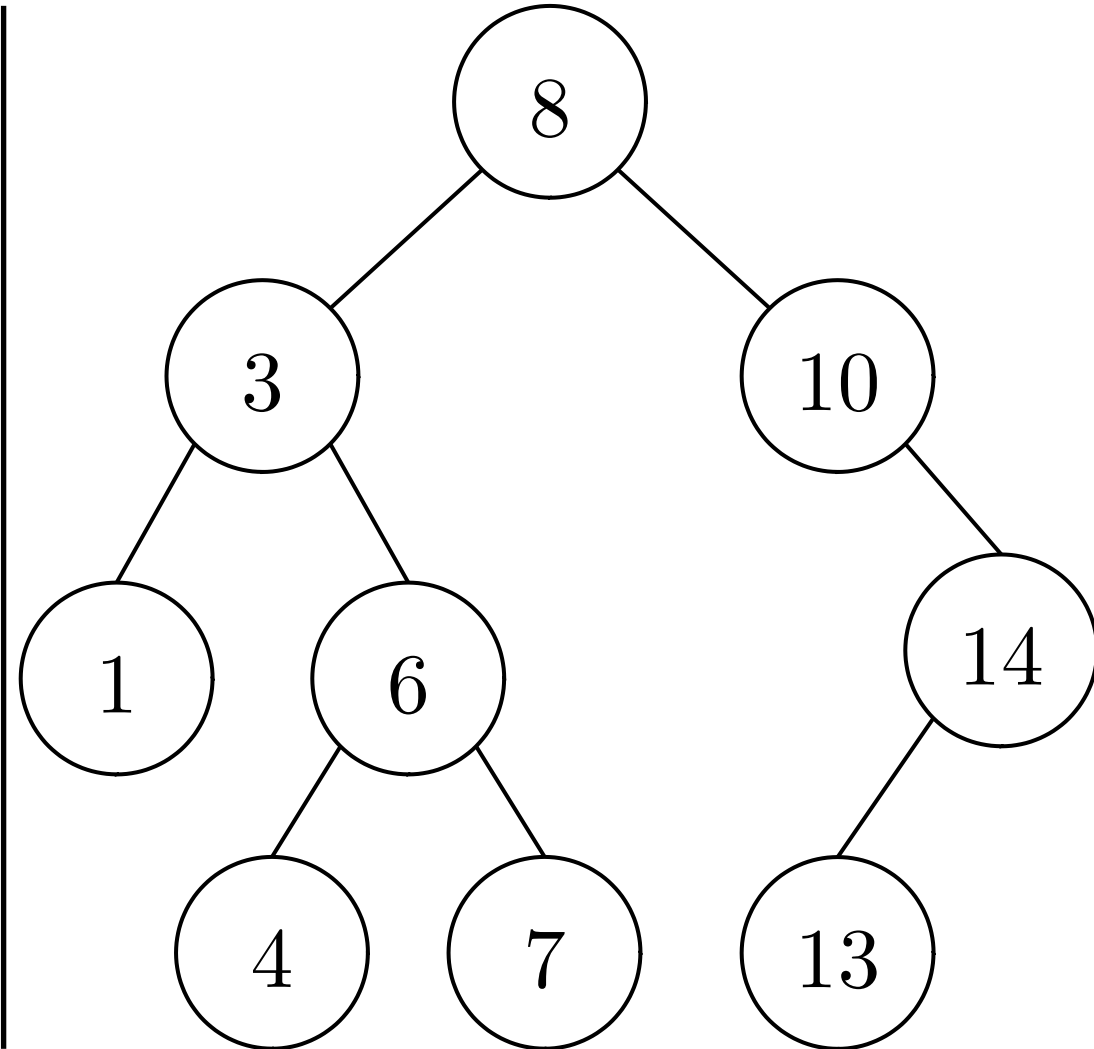
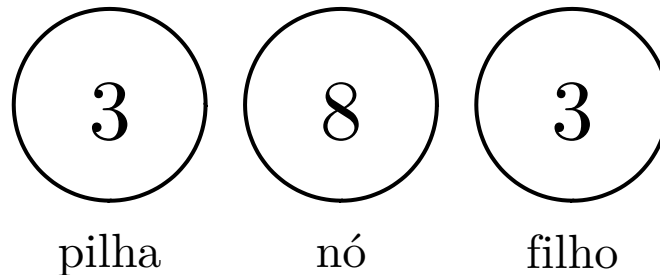
nó

filho



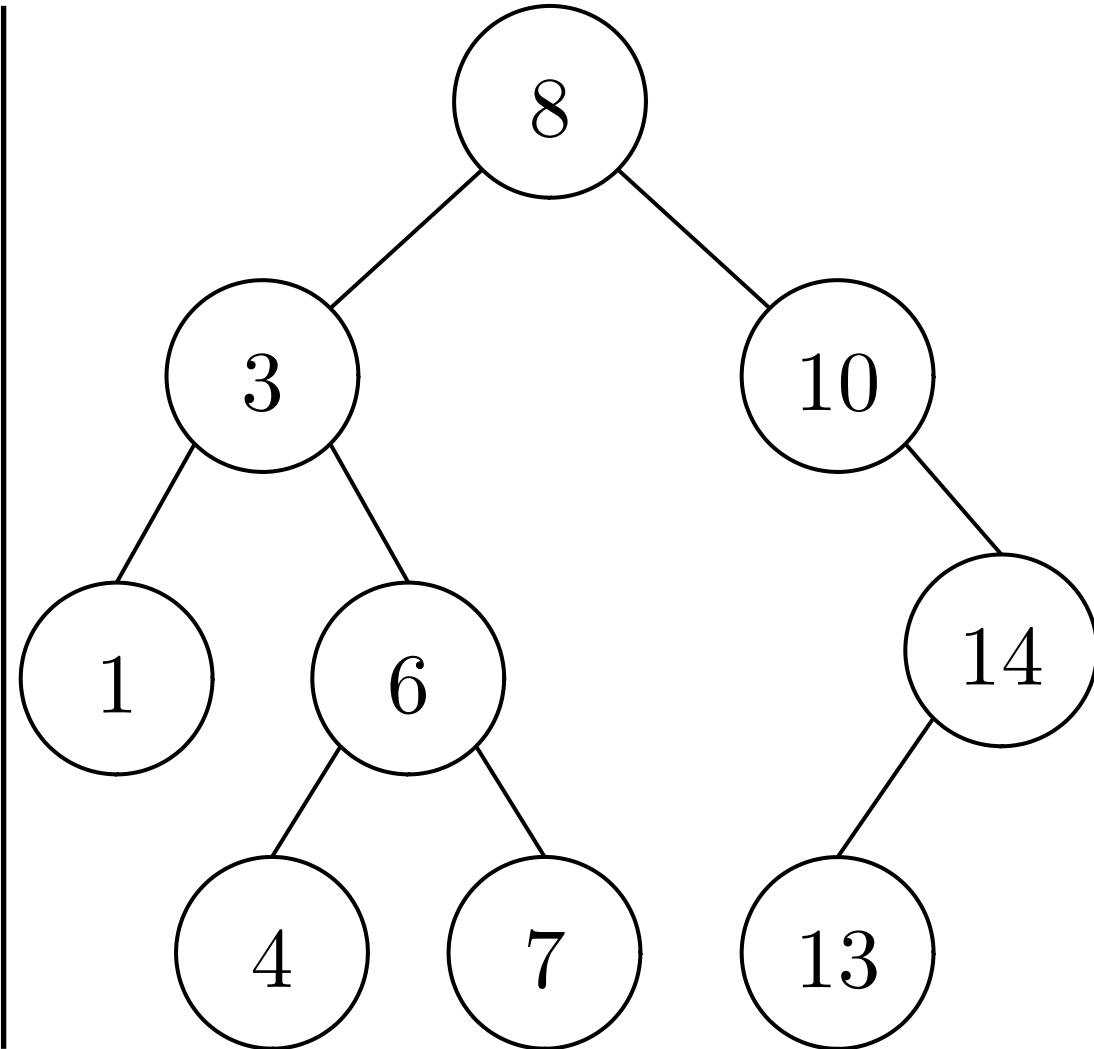
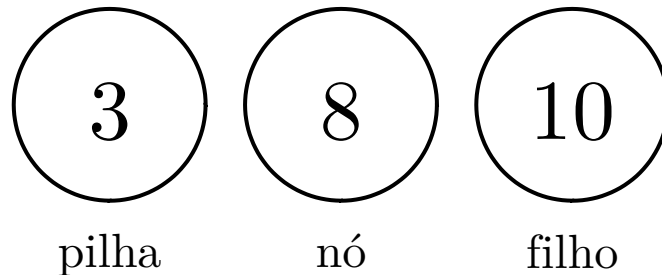
busca em profundidade

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```



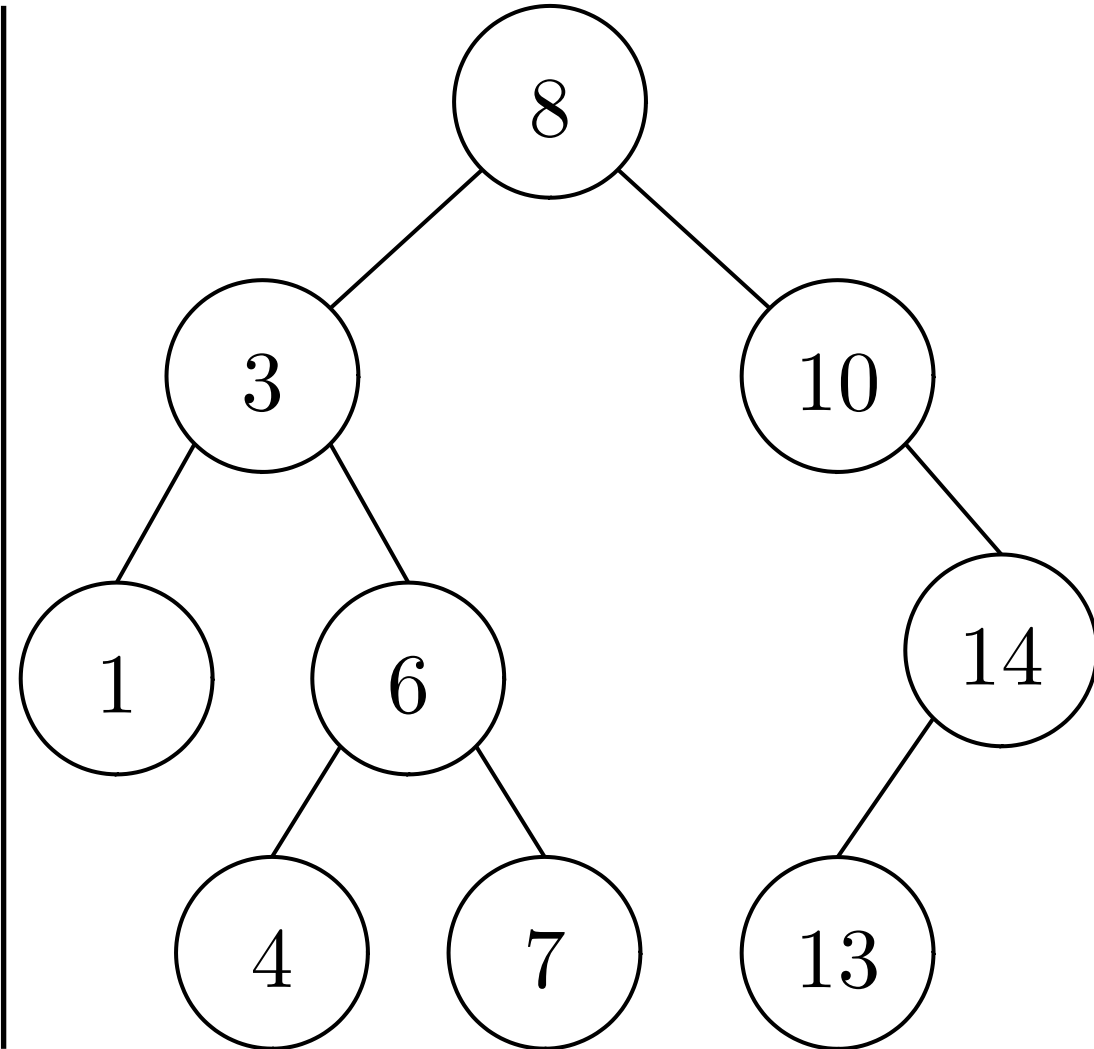
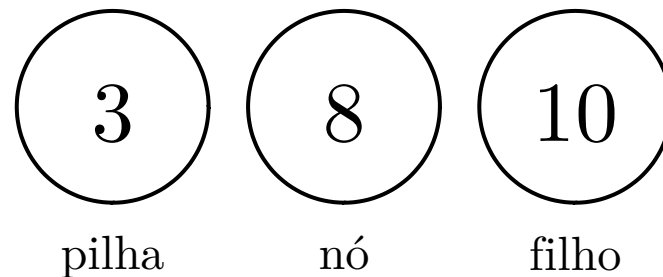
busca em profundidade

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    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
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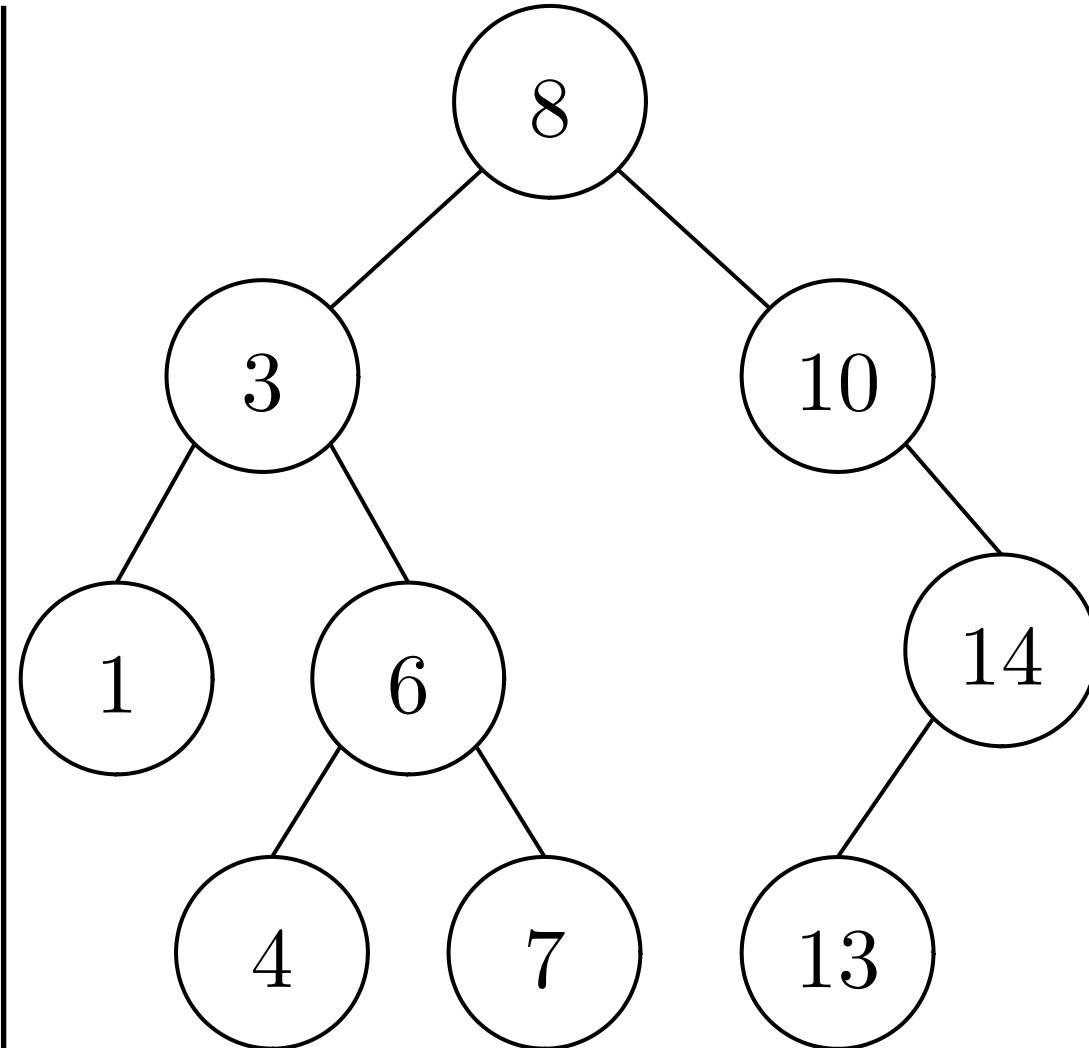
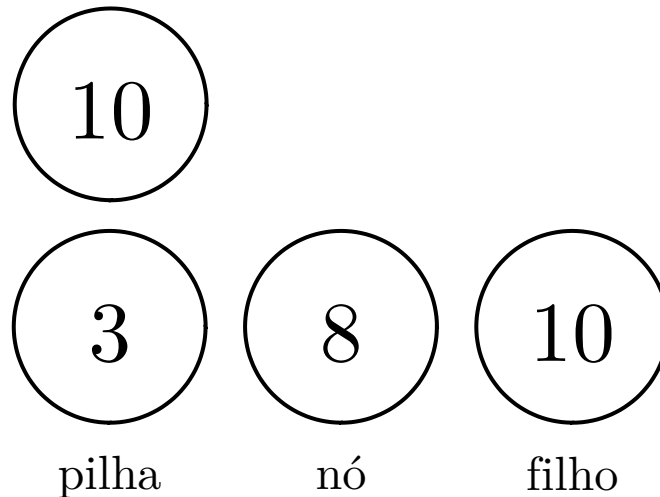
busca em profundidade

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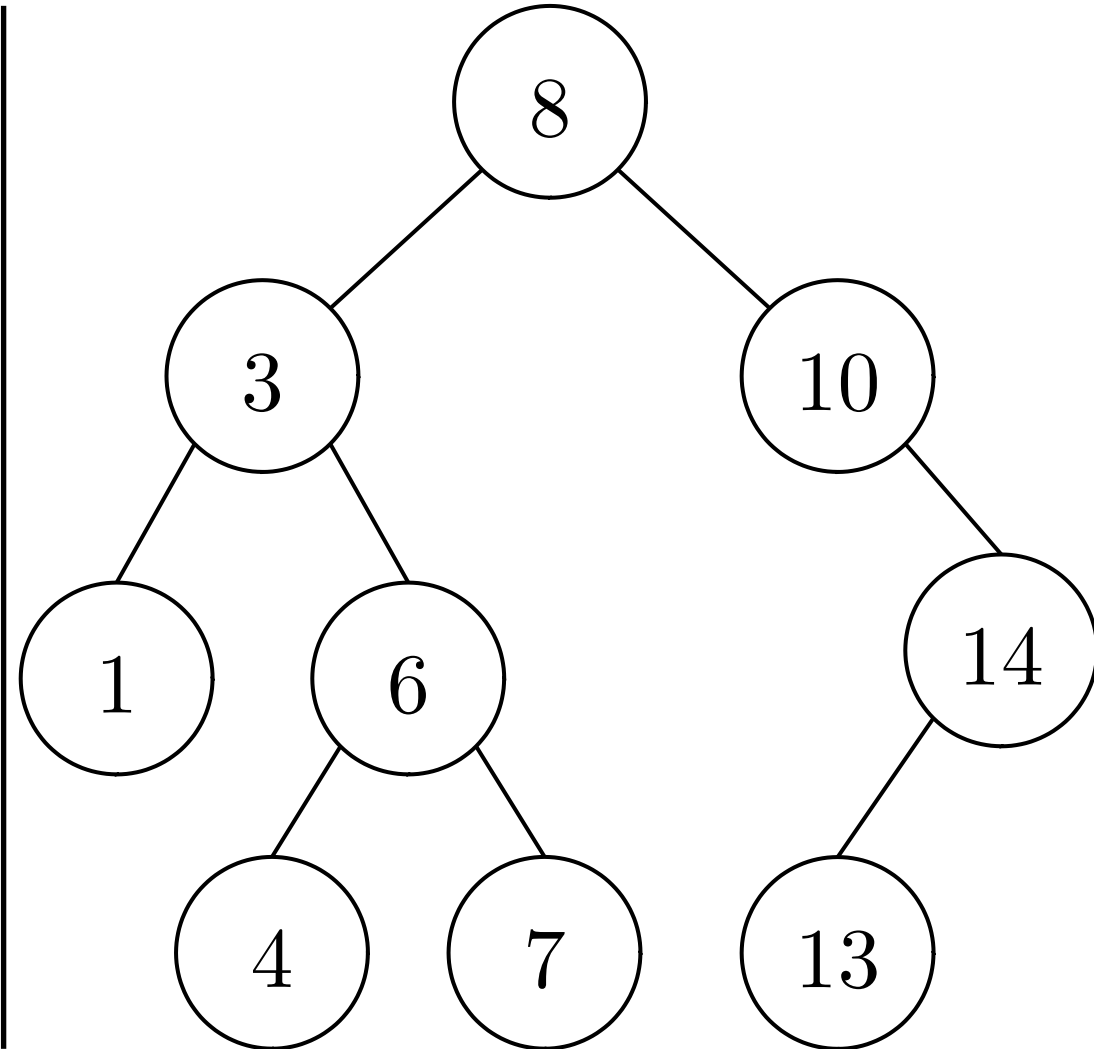
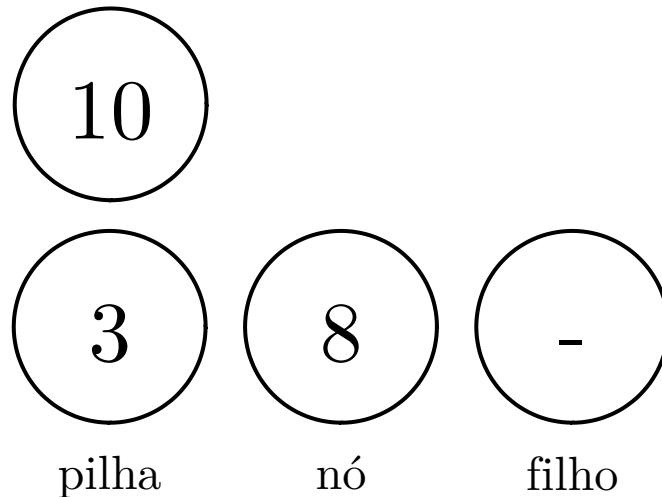
busca em profundidade

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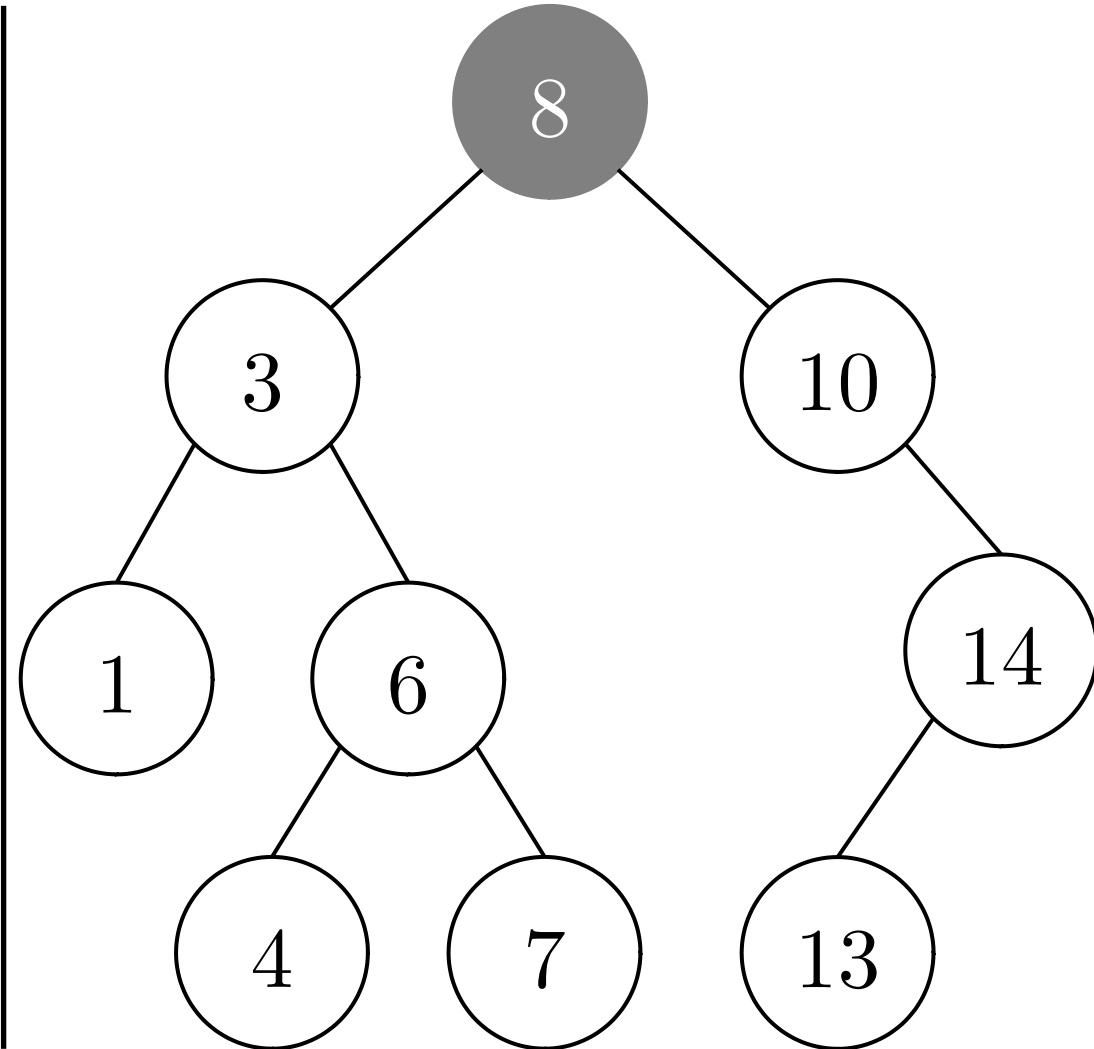
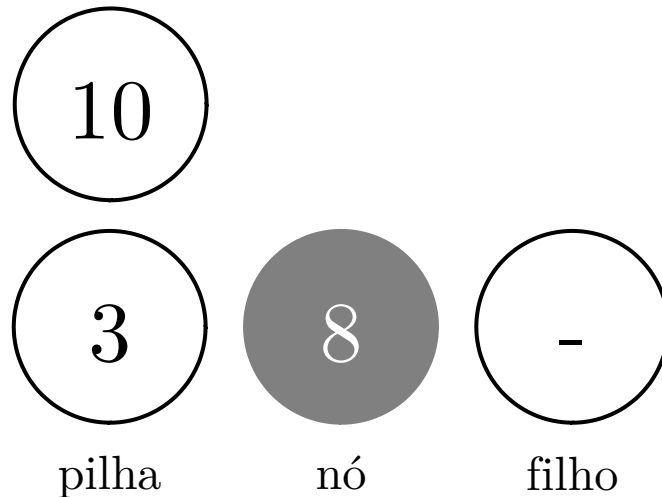
busca em profundidade

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```



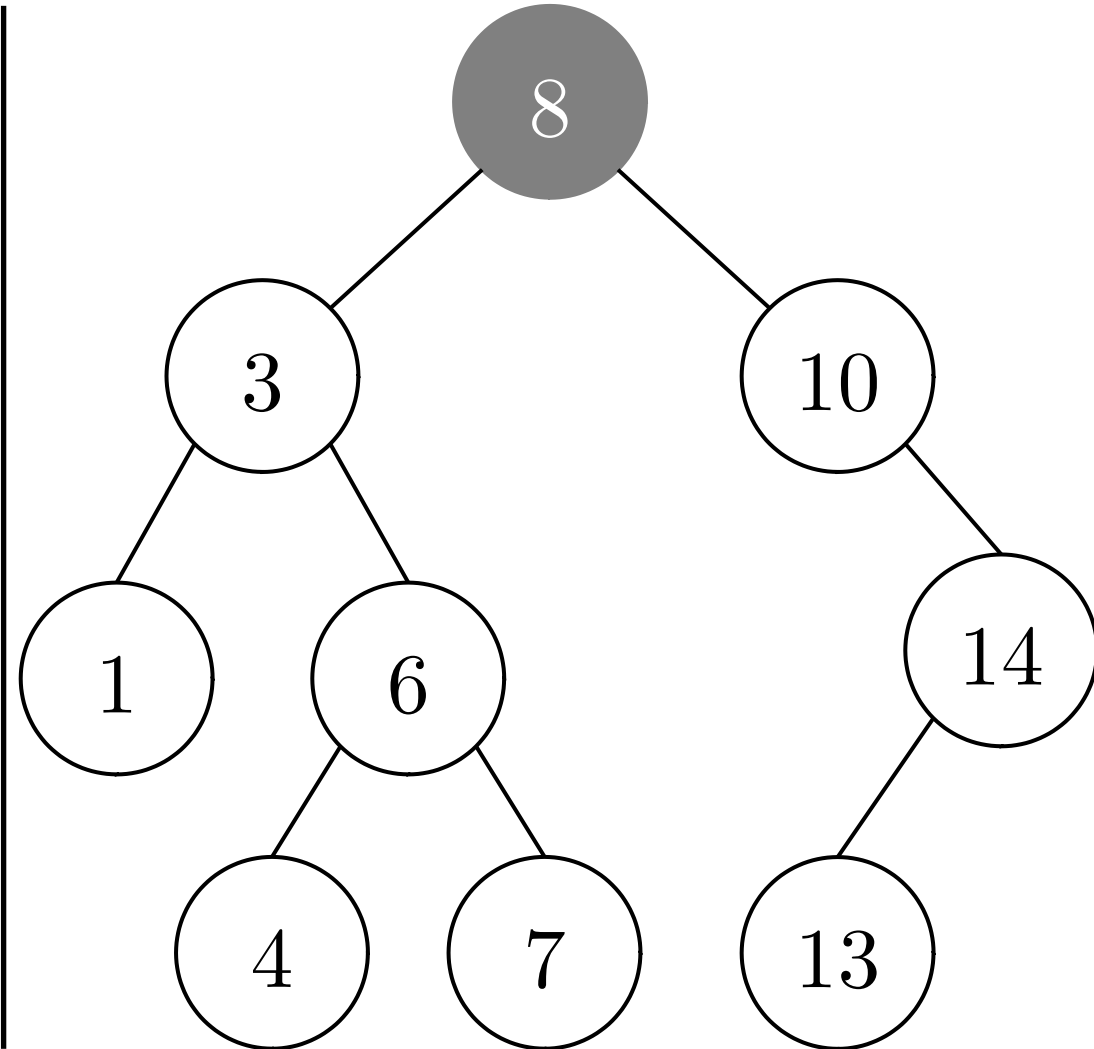
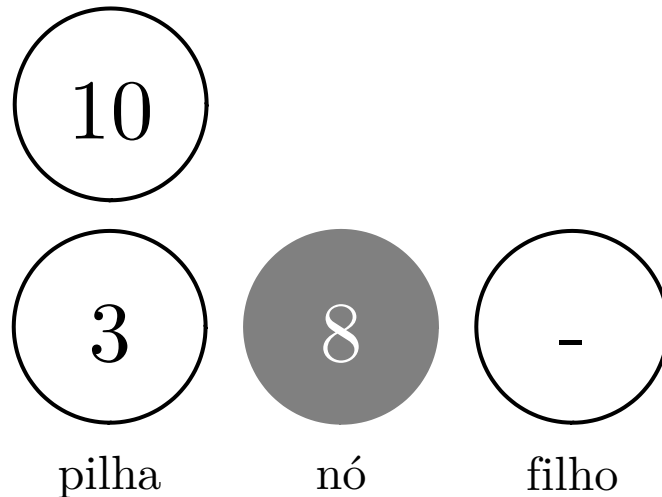
busca em profundidade

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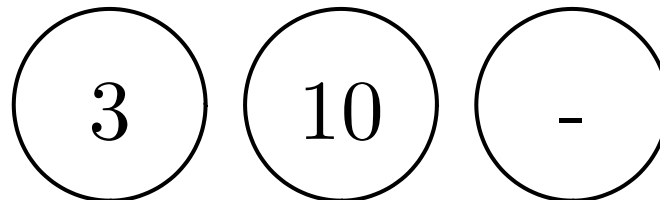
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
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            if (not filho.visitado):  
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```



busca em profundidade

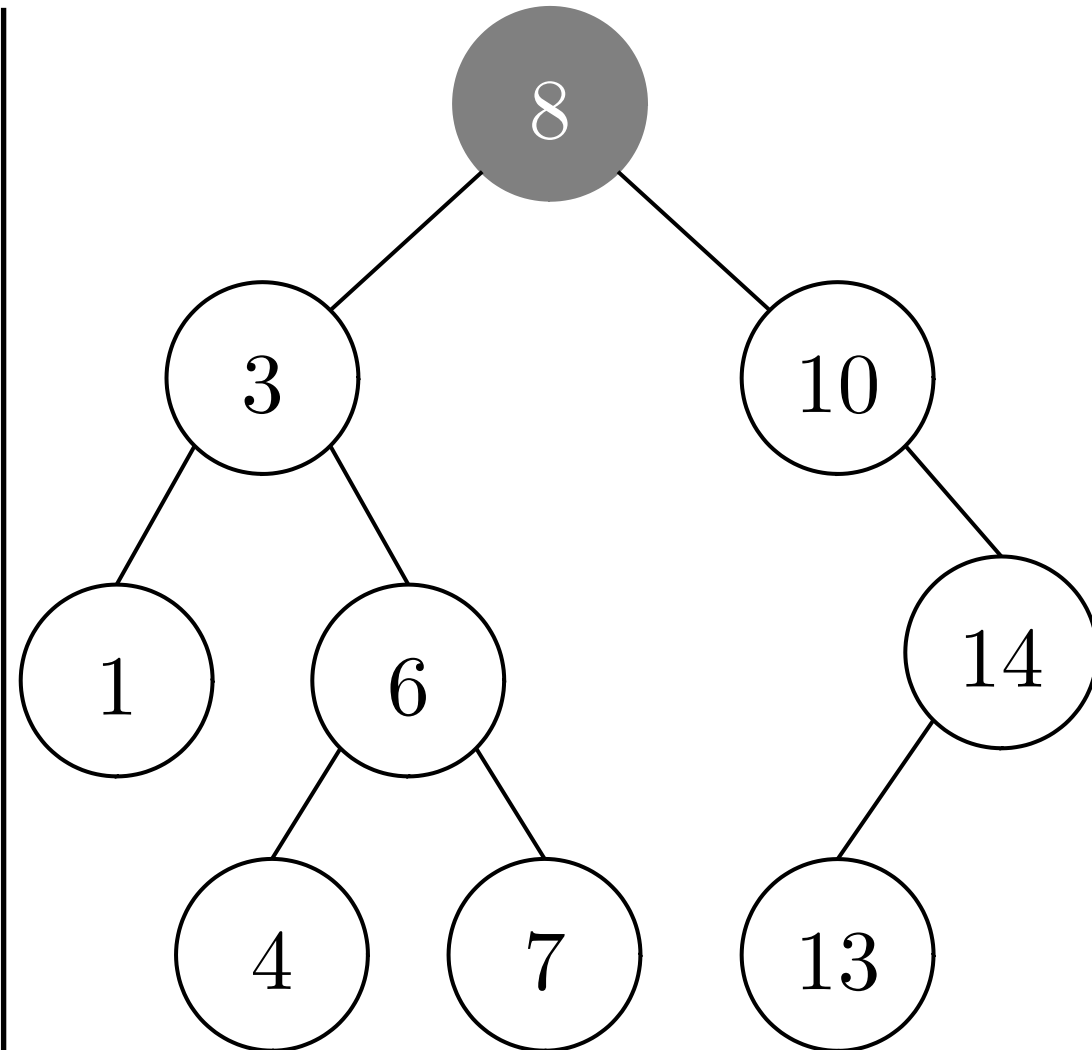
```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
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        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



pilha

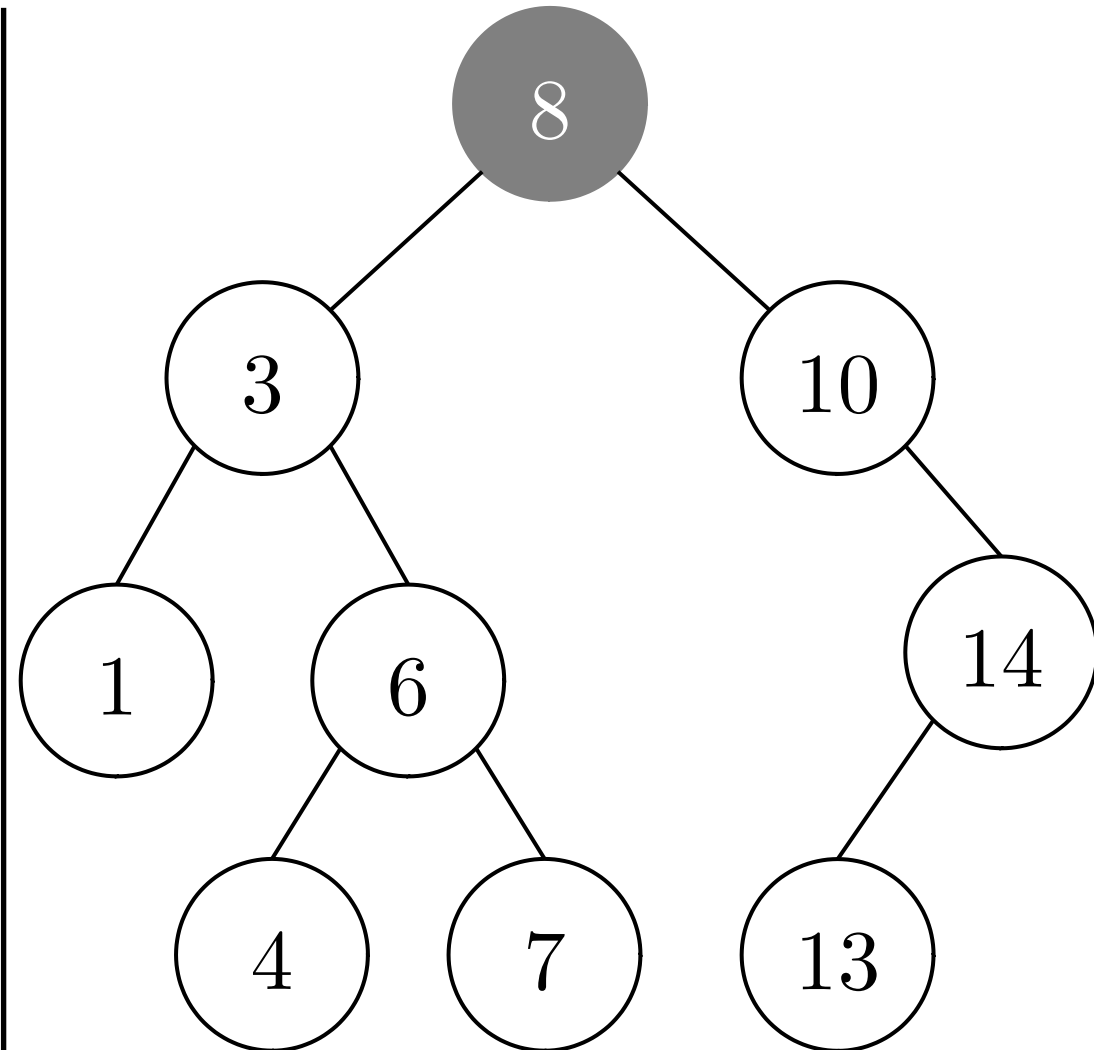
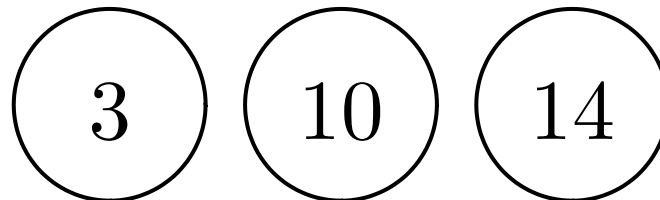
nó

filho



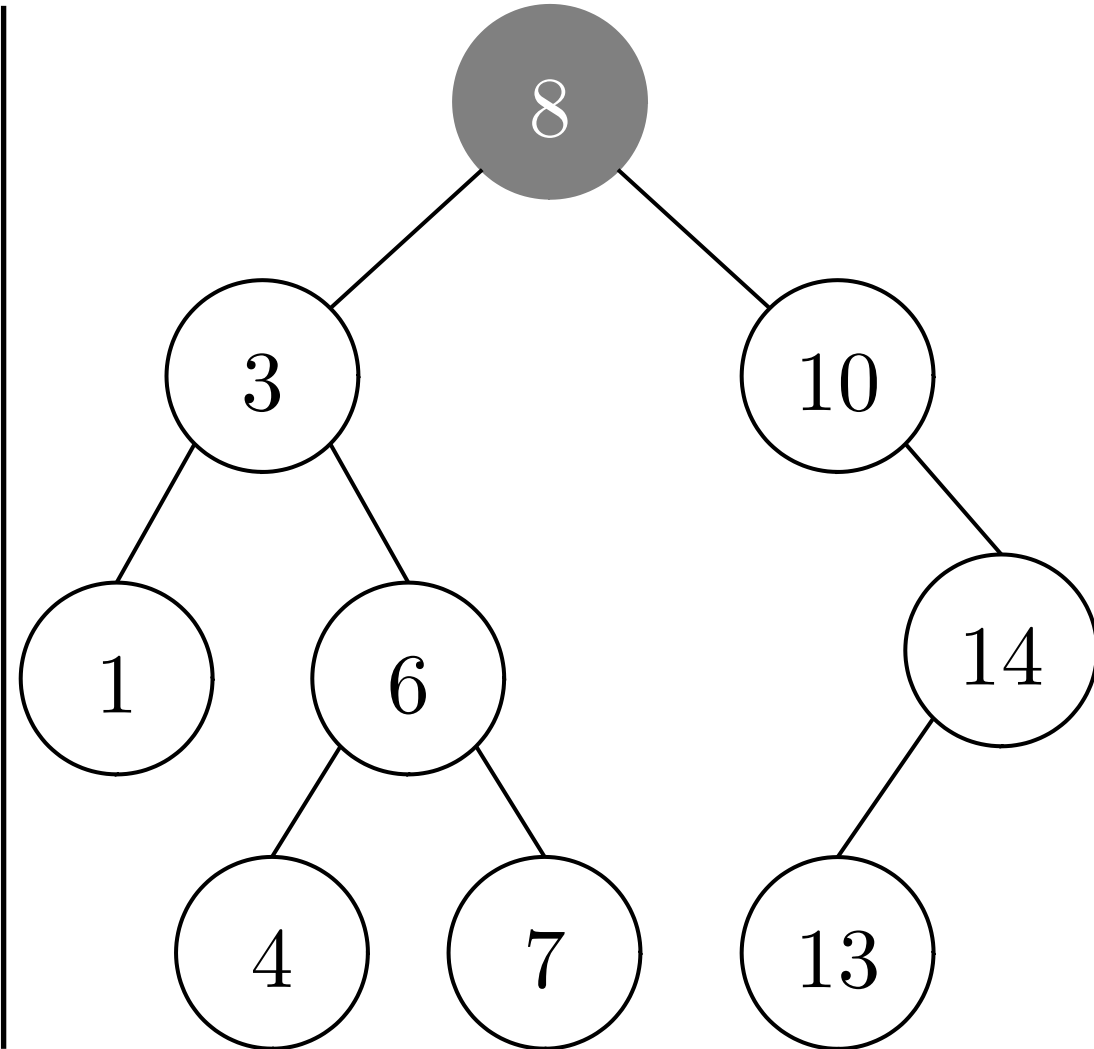
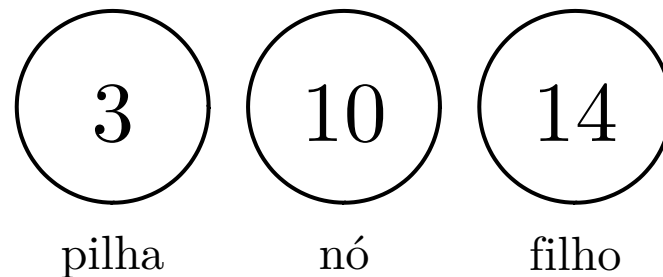
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



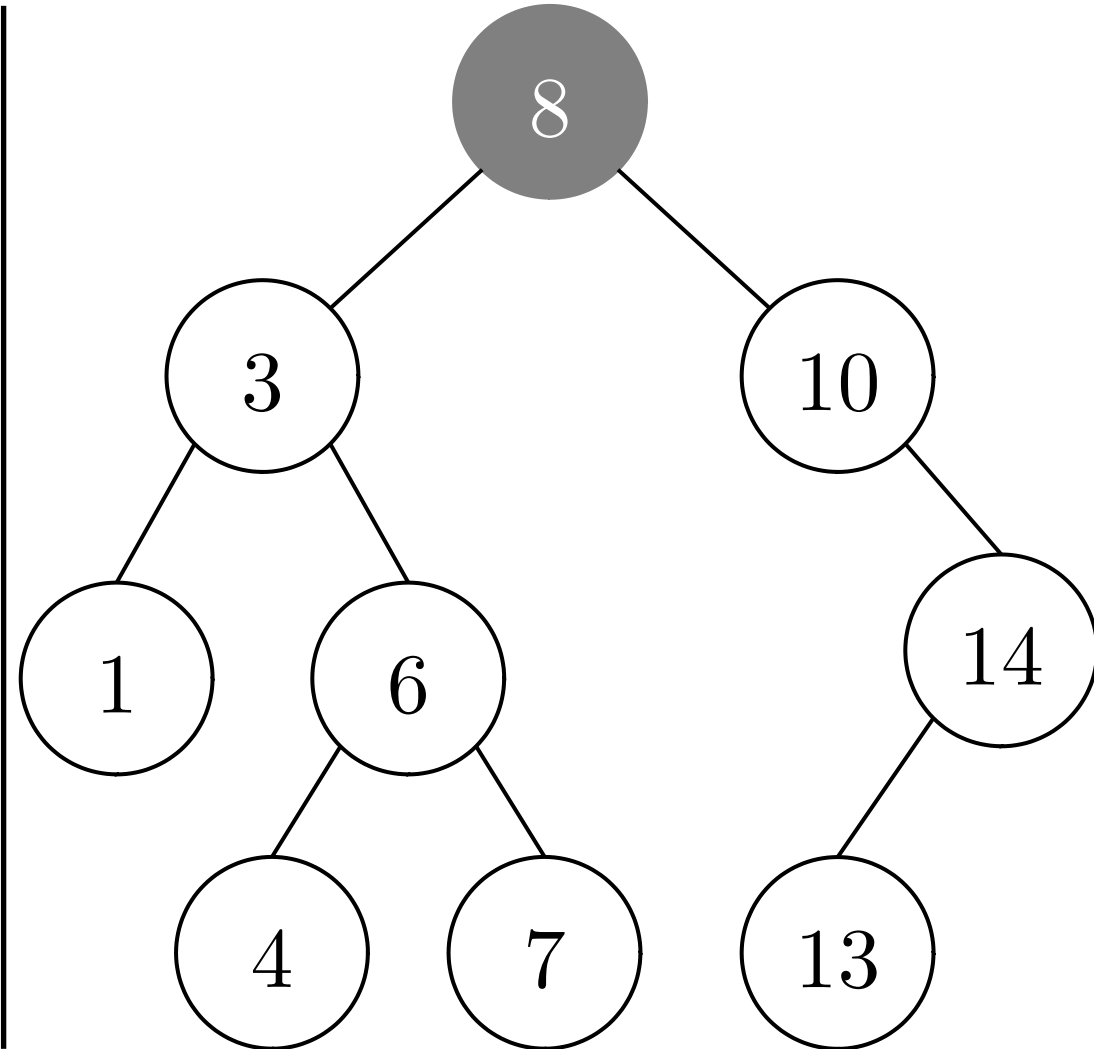
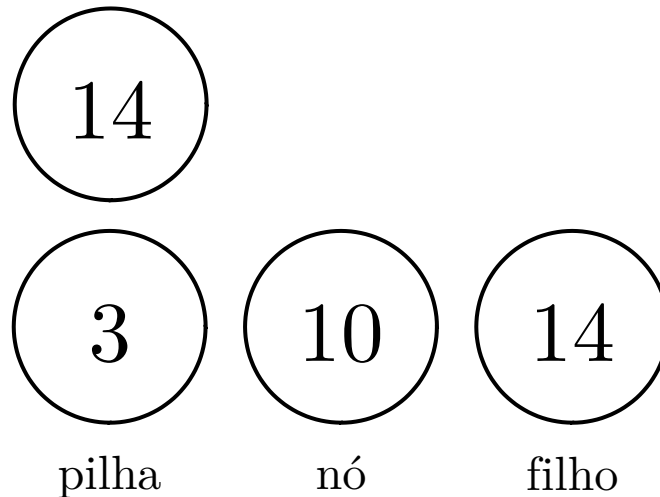
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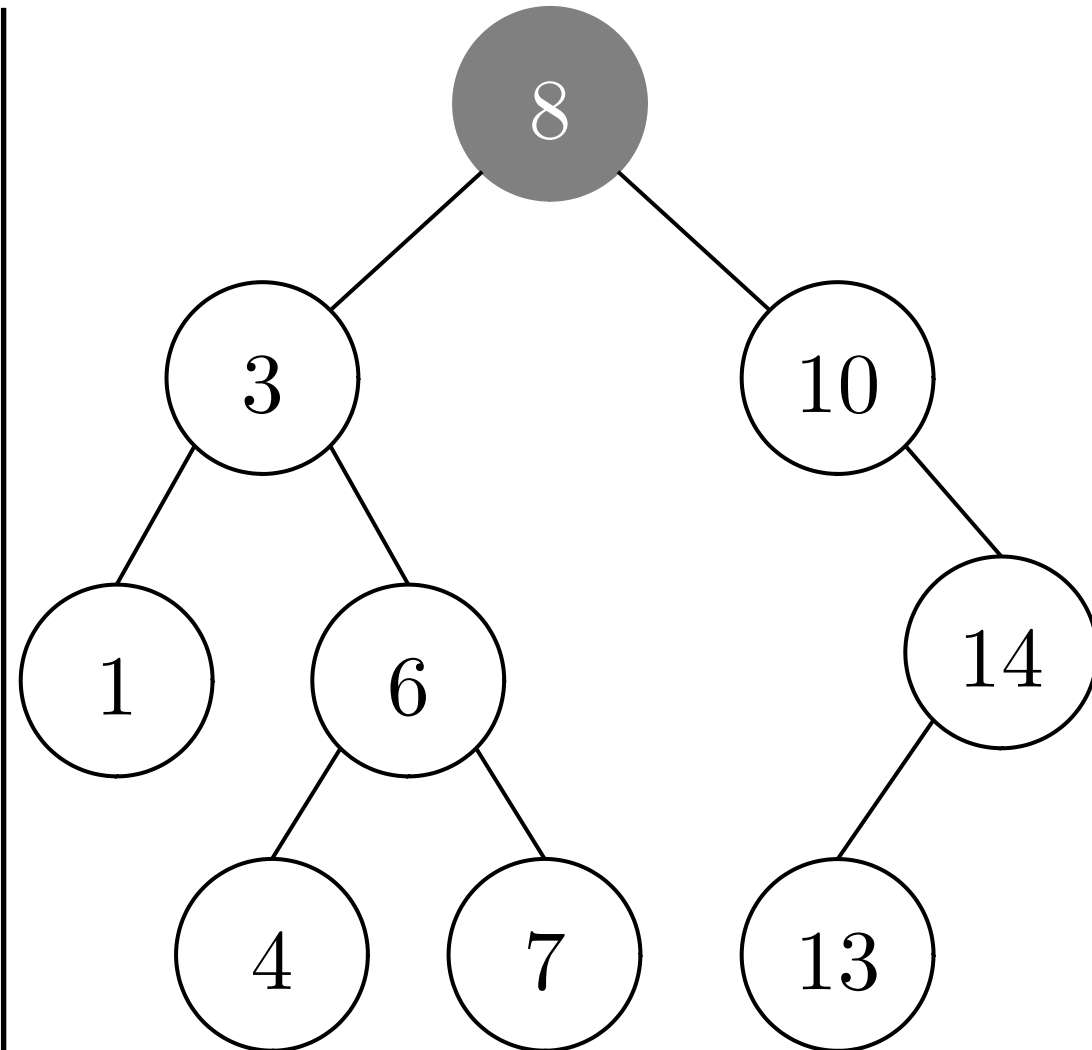
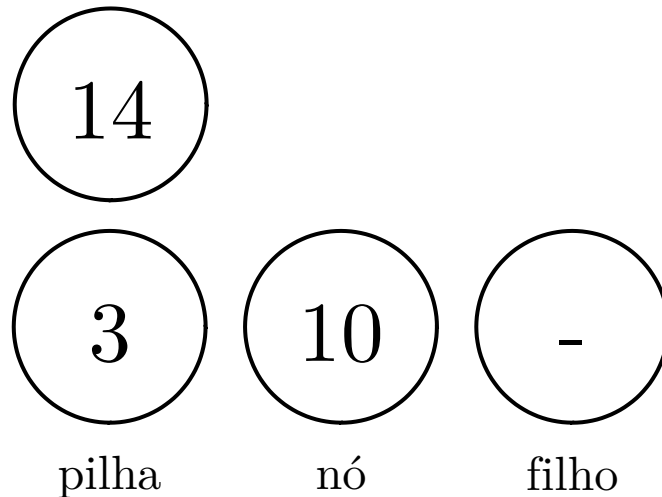
busca em profundidade

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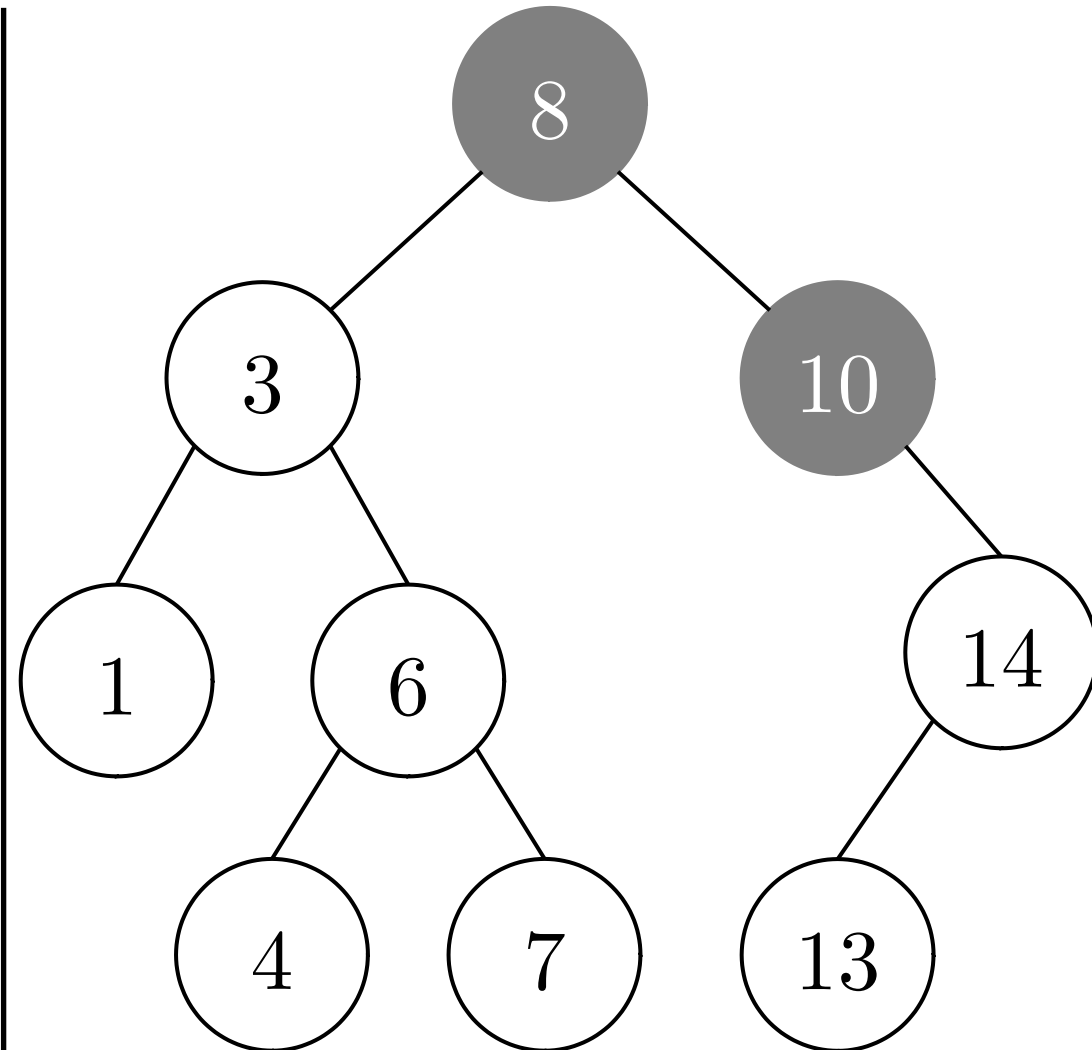
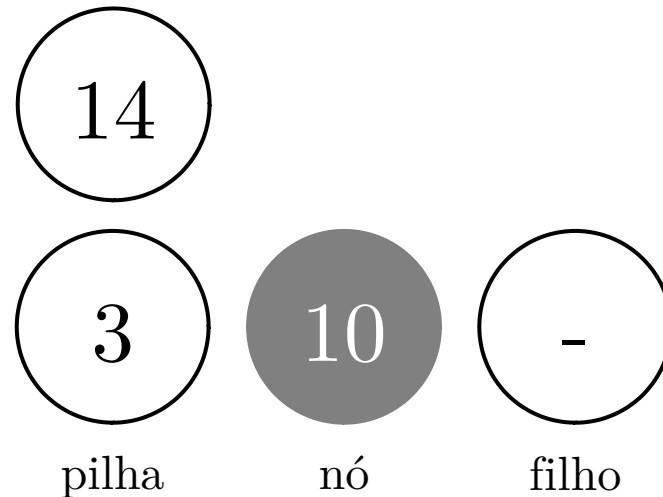
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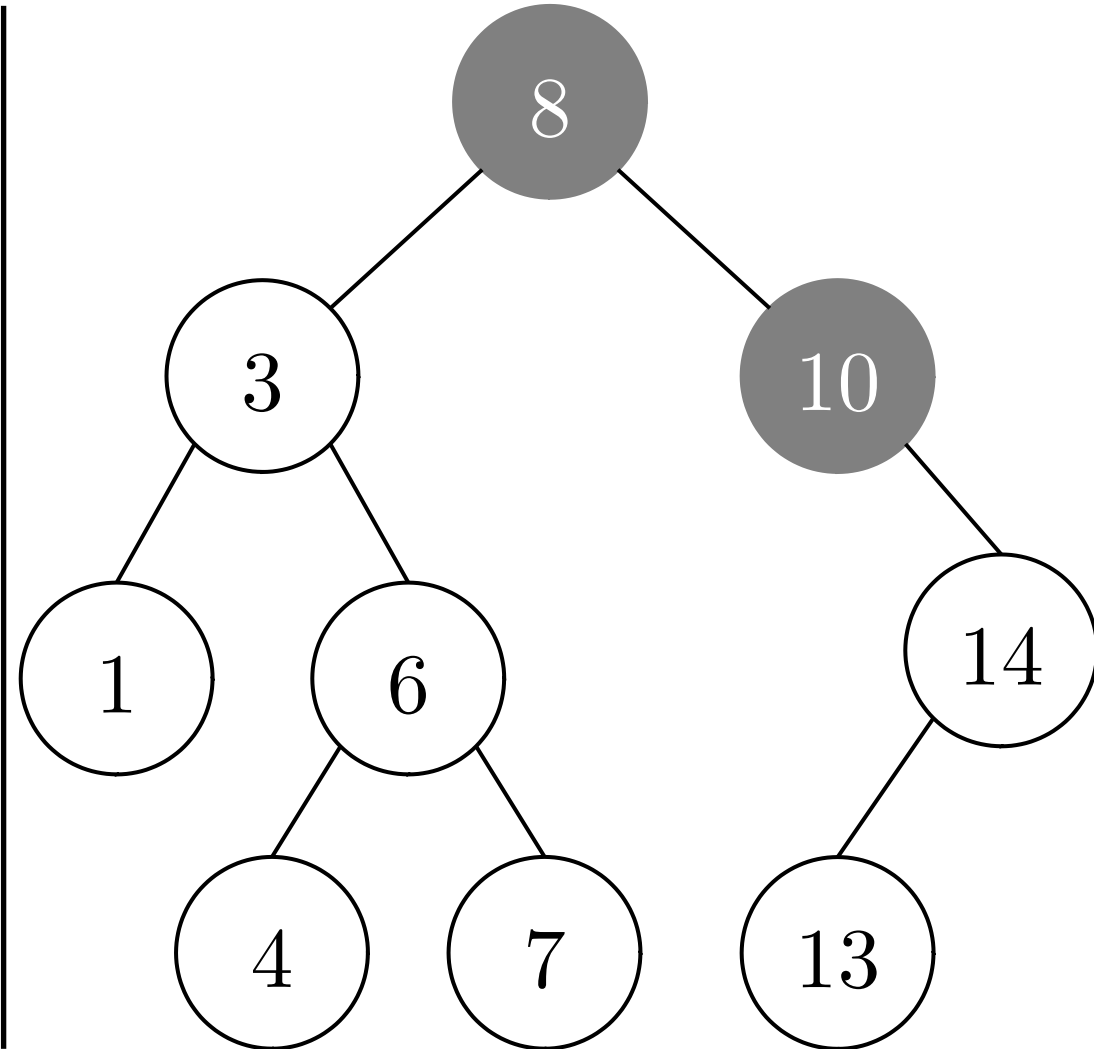
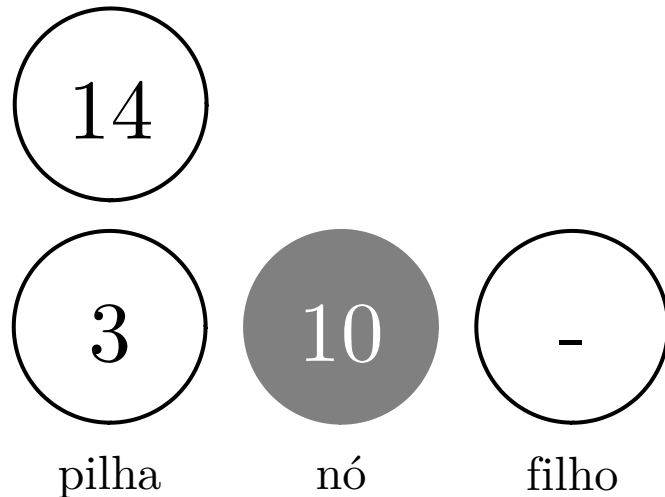
busca em profundidade

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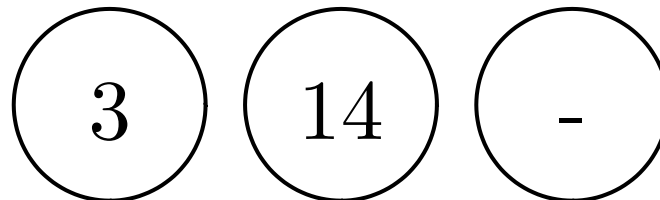
busca em profundidade

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def dfs(nó_inicial):  
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busca em profundidade

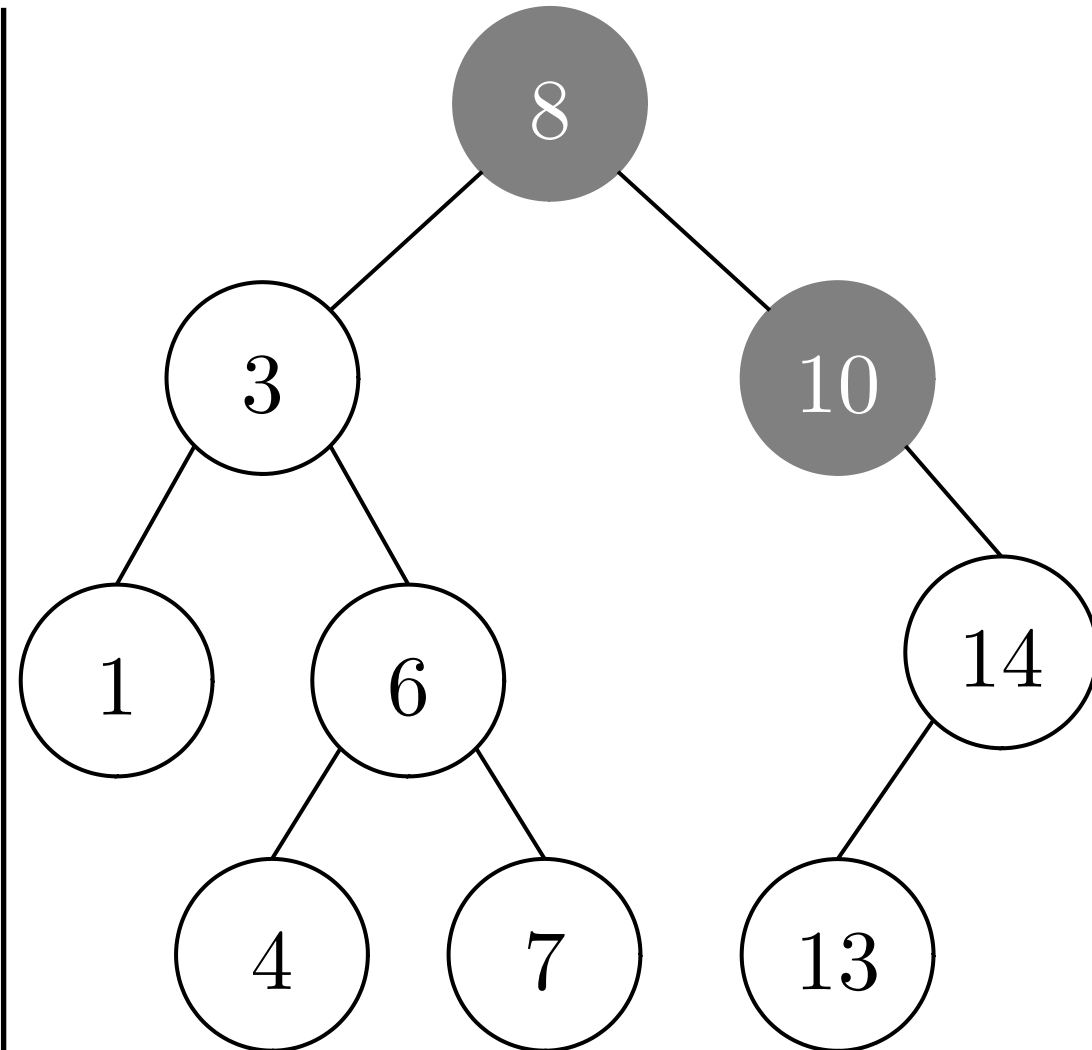
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pilha

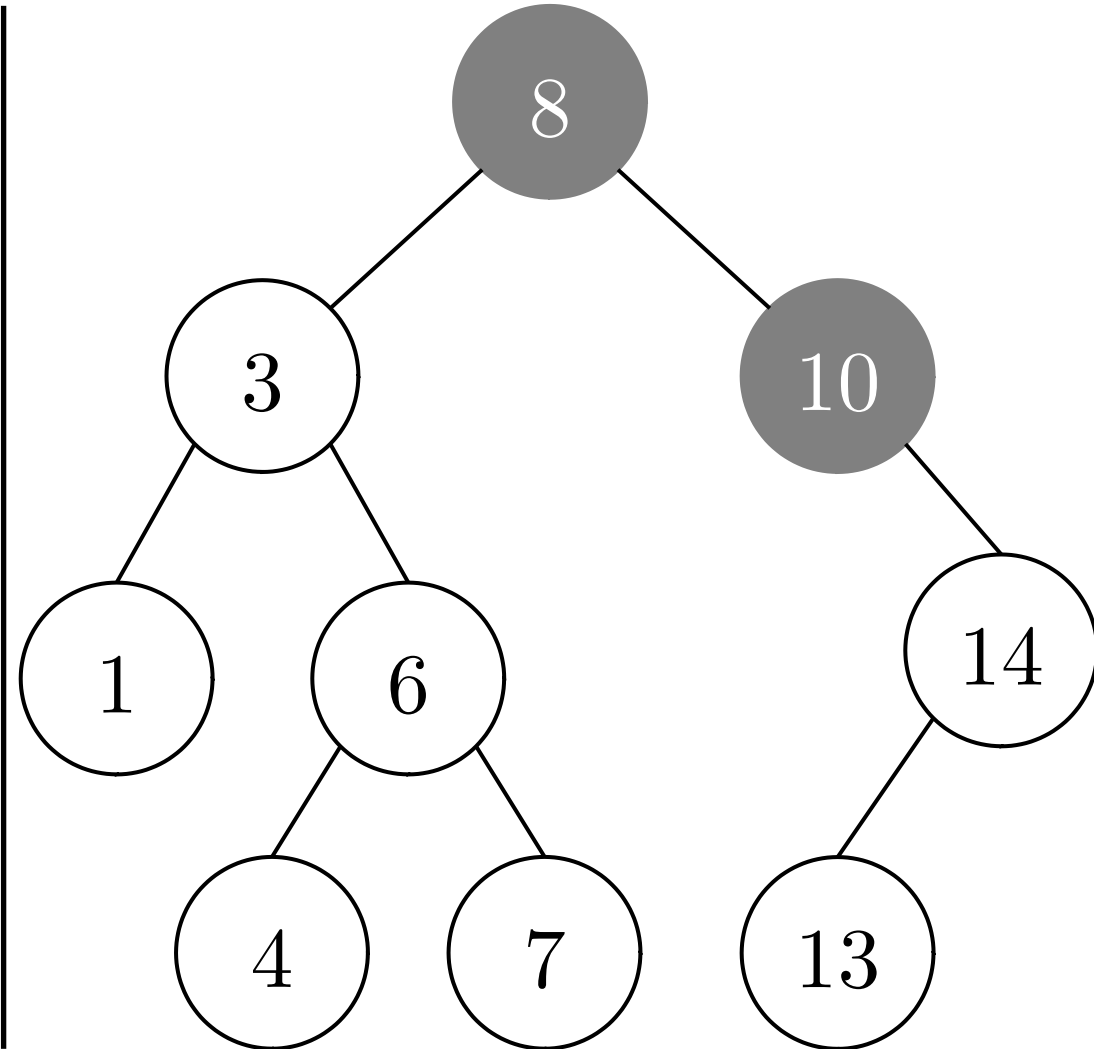
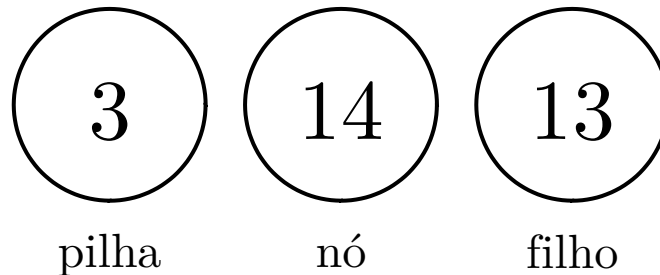
nó

filho



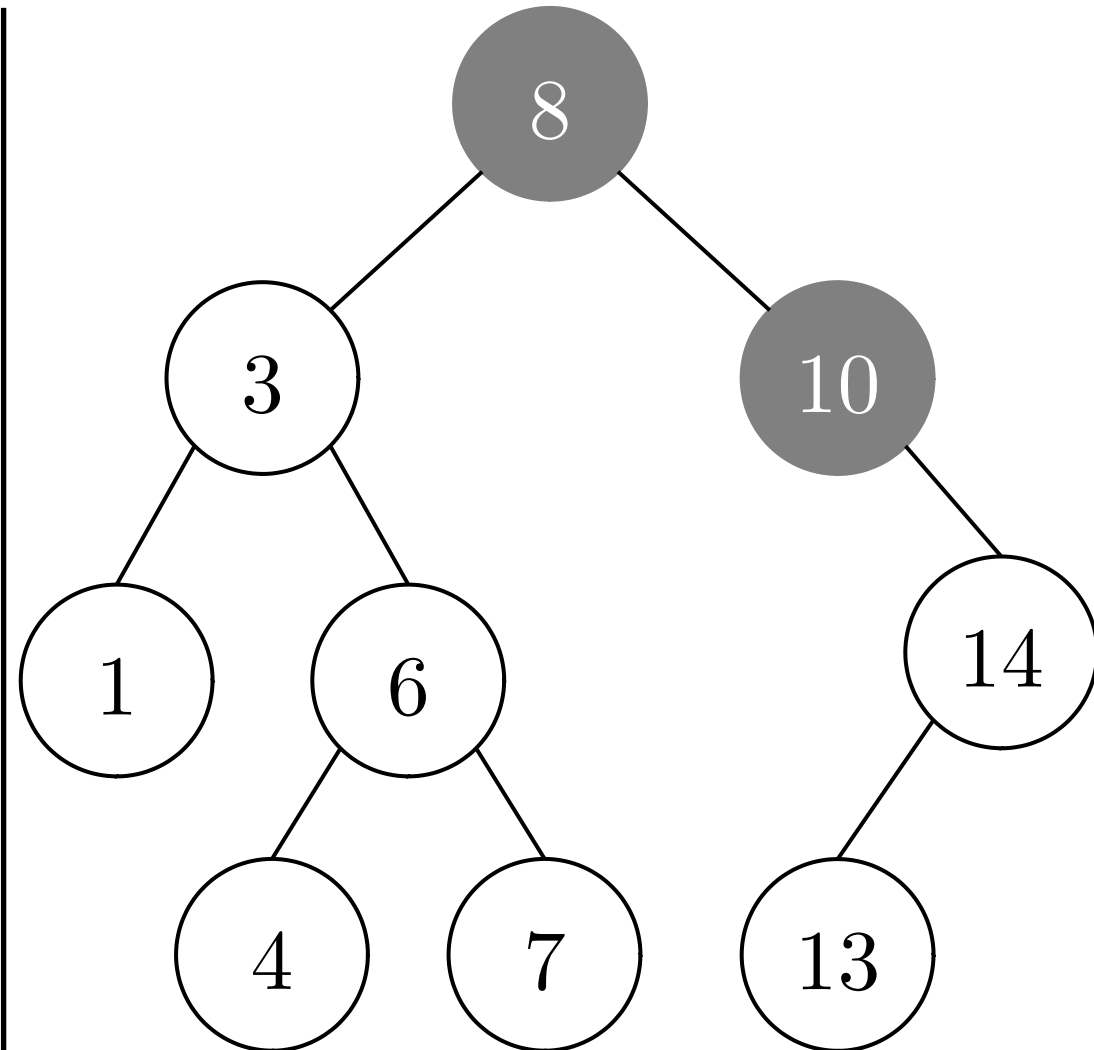
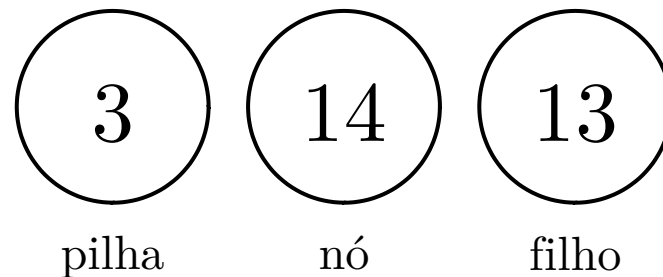
busca em profundidade

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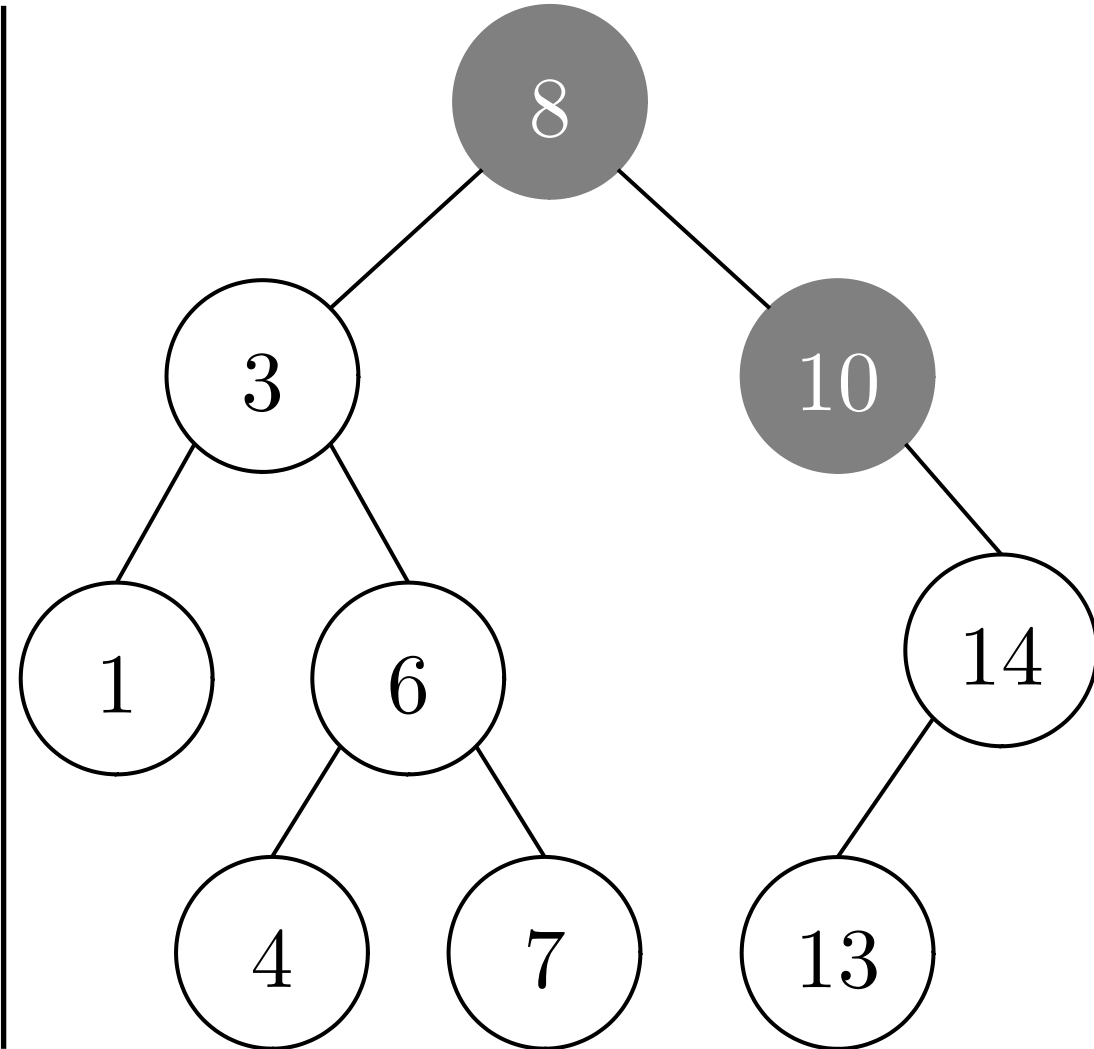
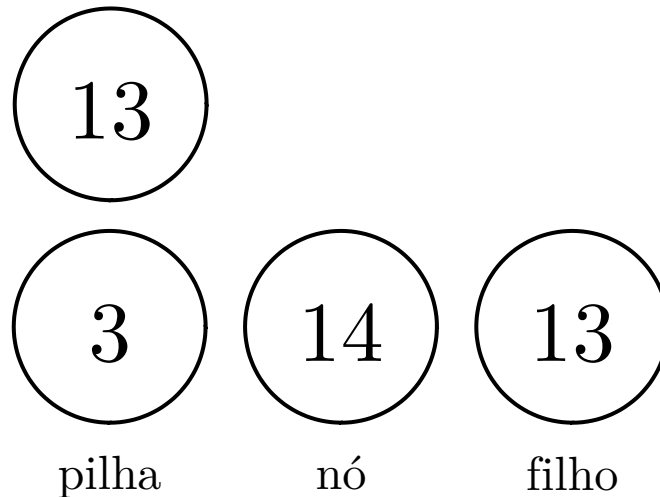
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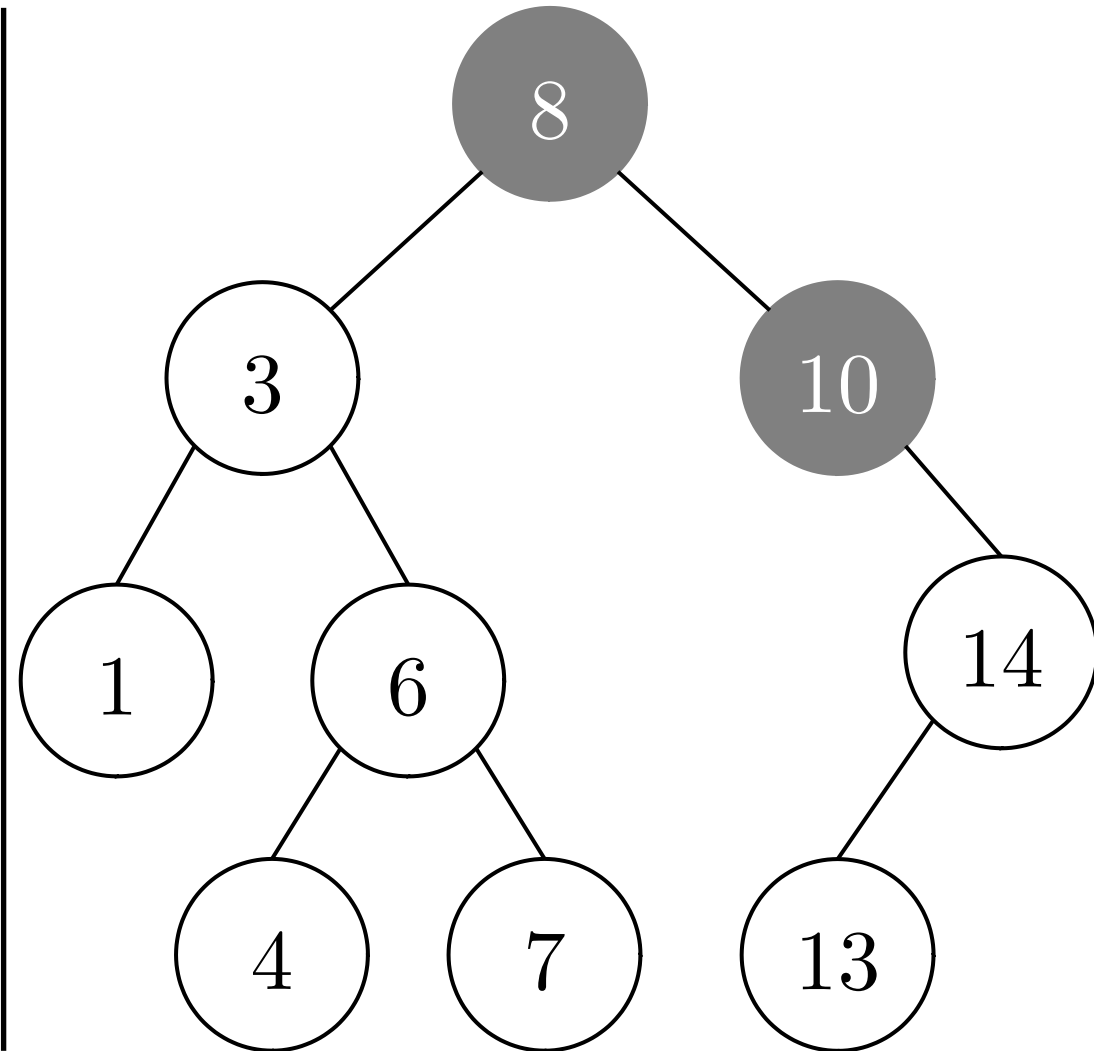
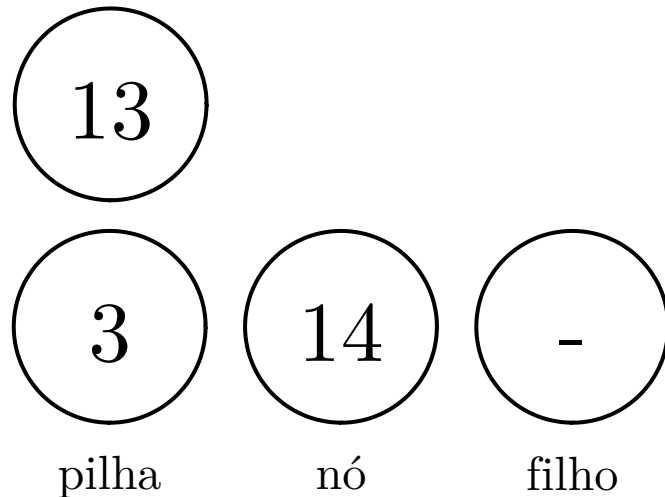
busca em profundidade

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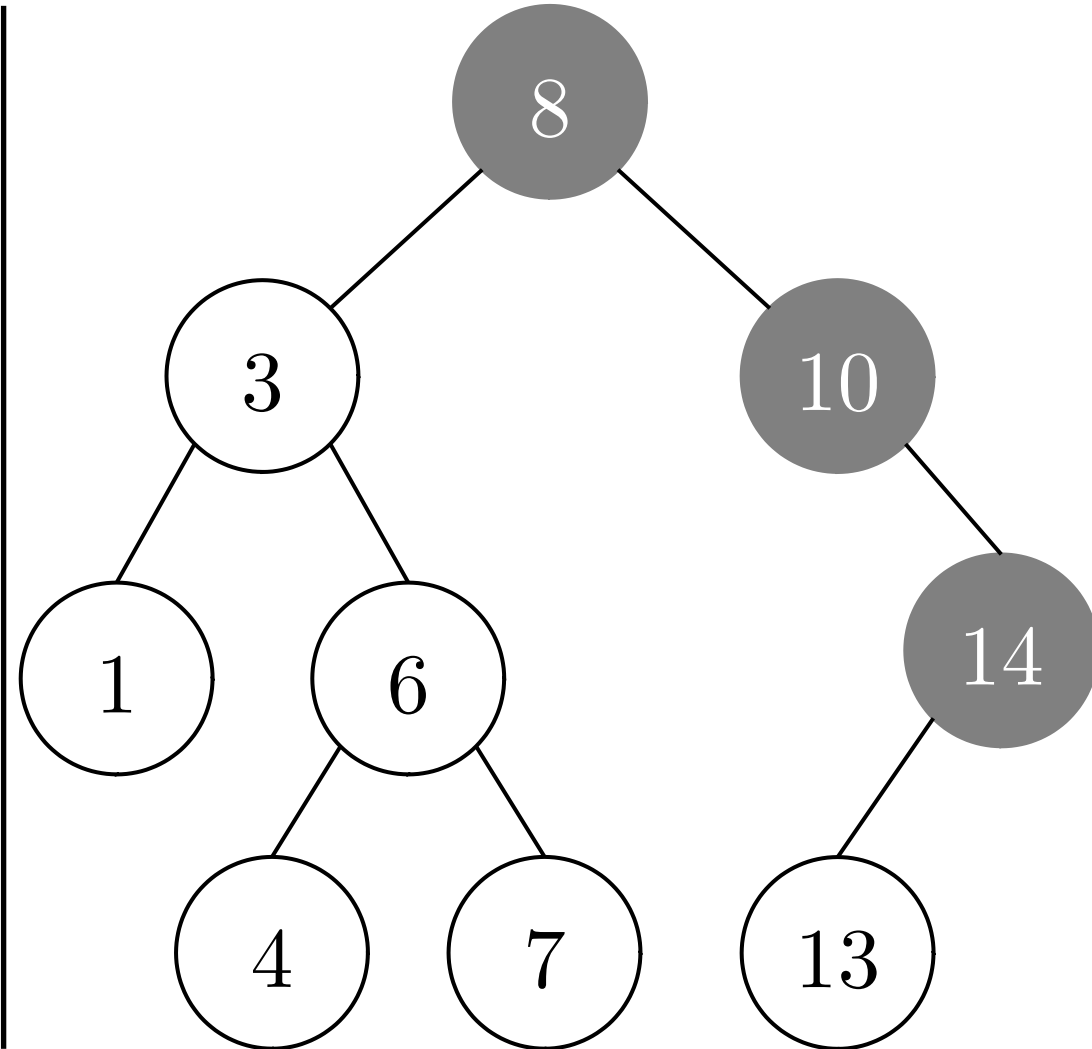
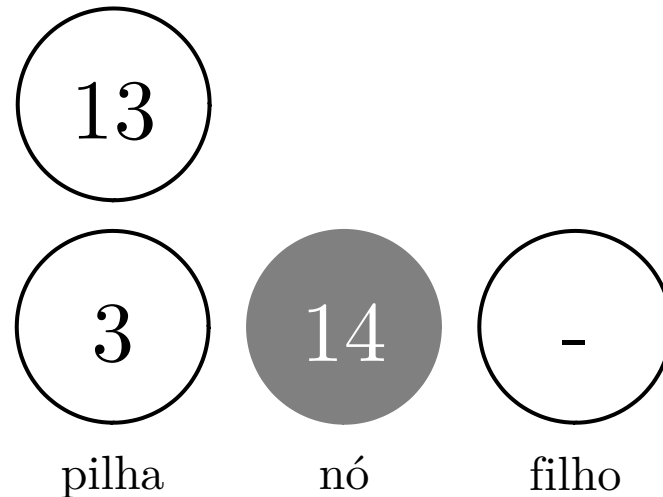
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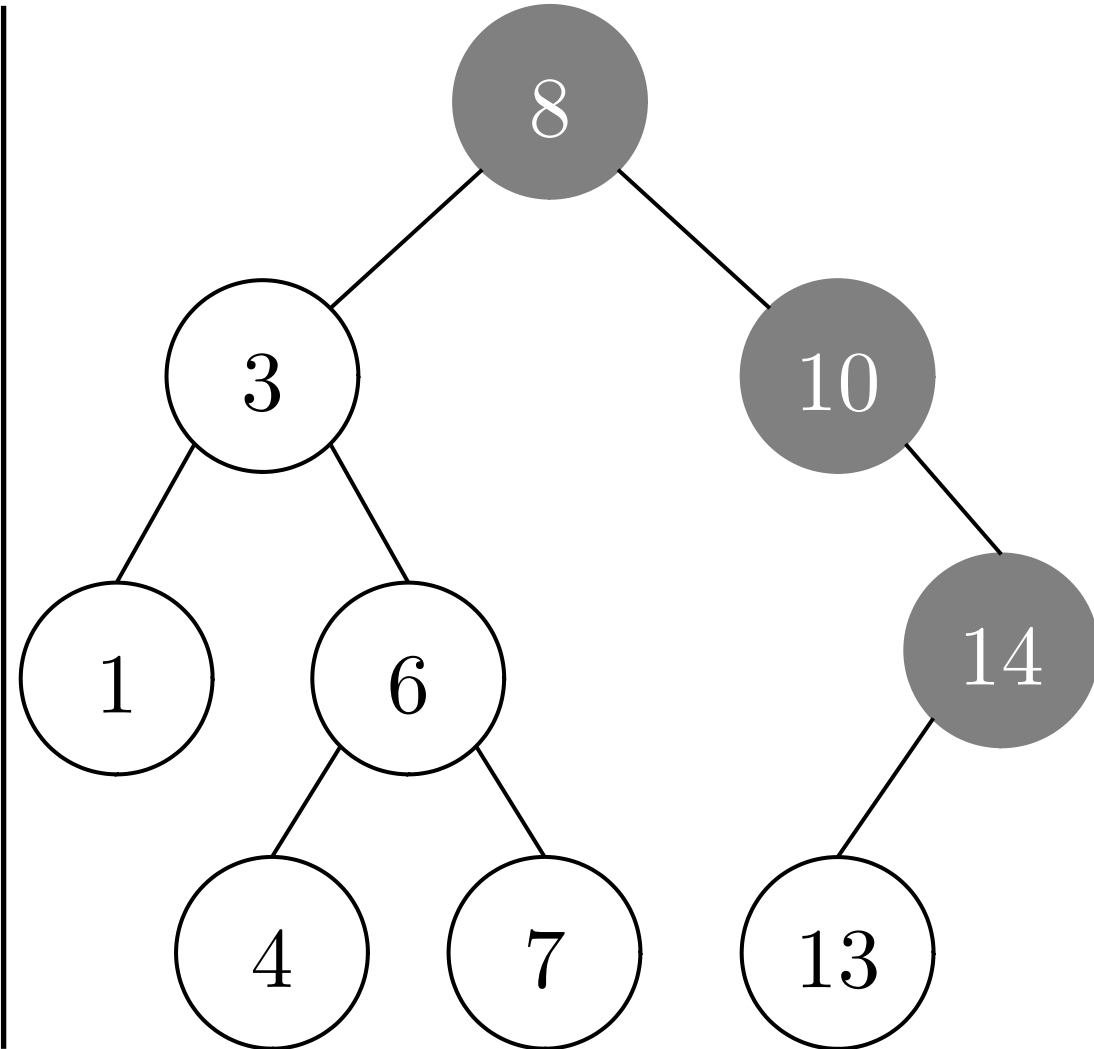
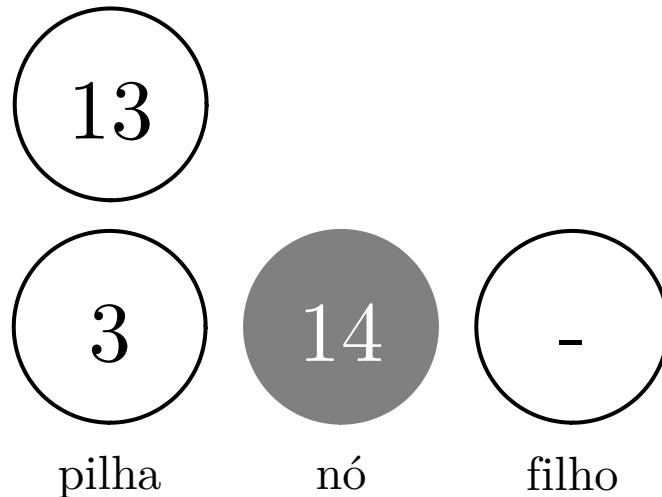
busca em profundidade

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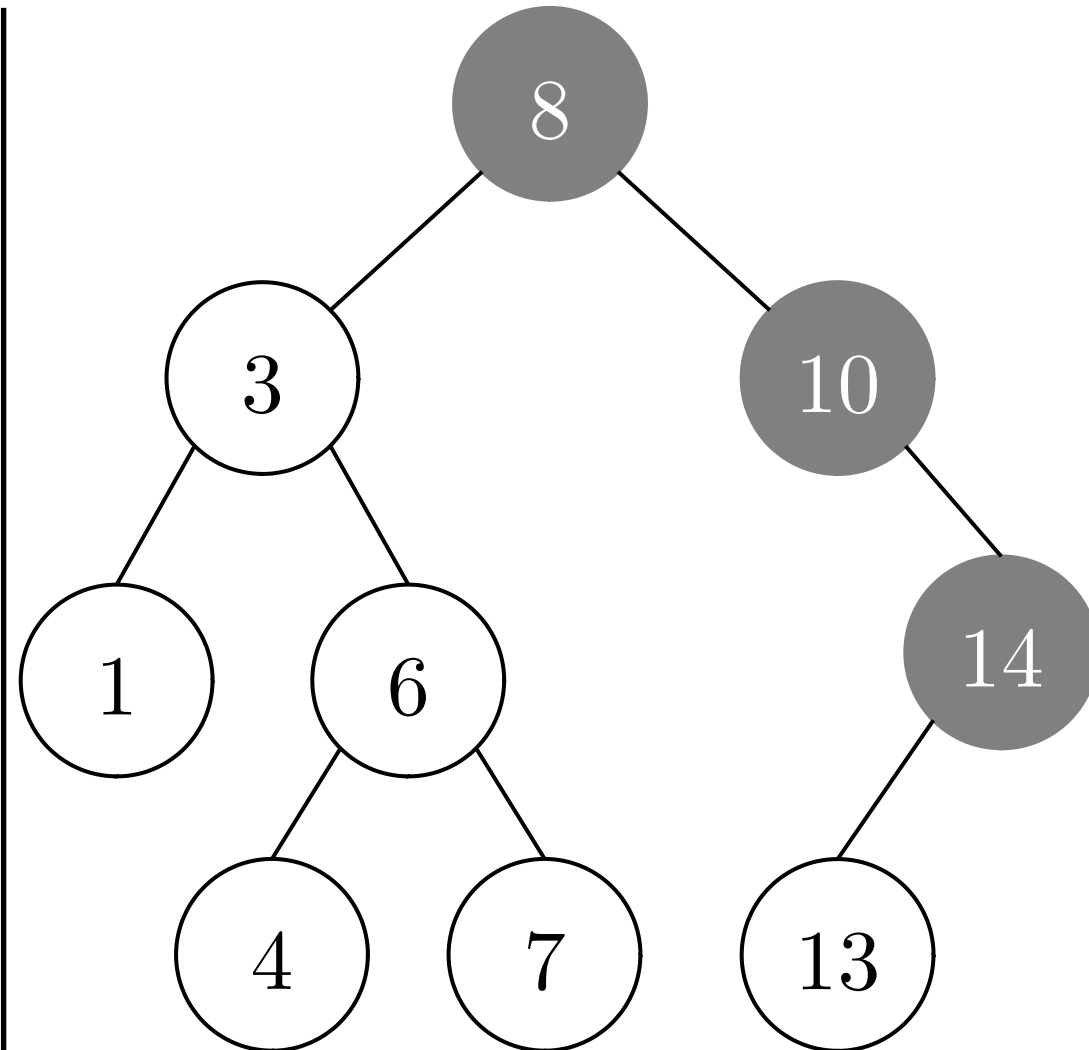
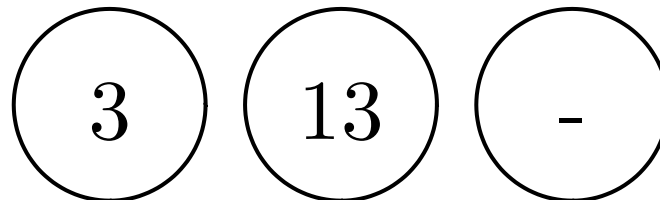
busca em profundidade

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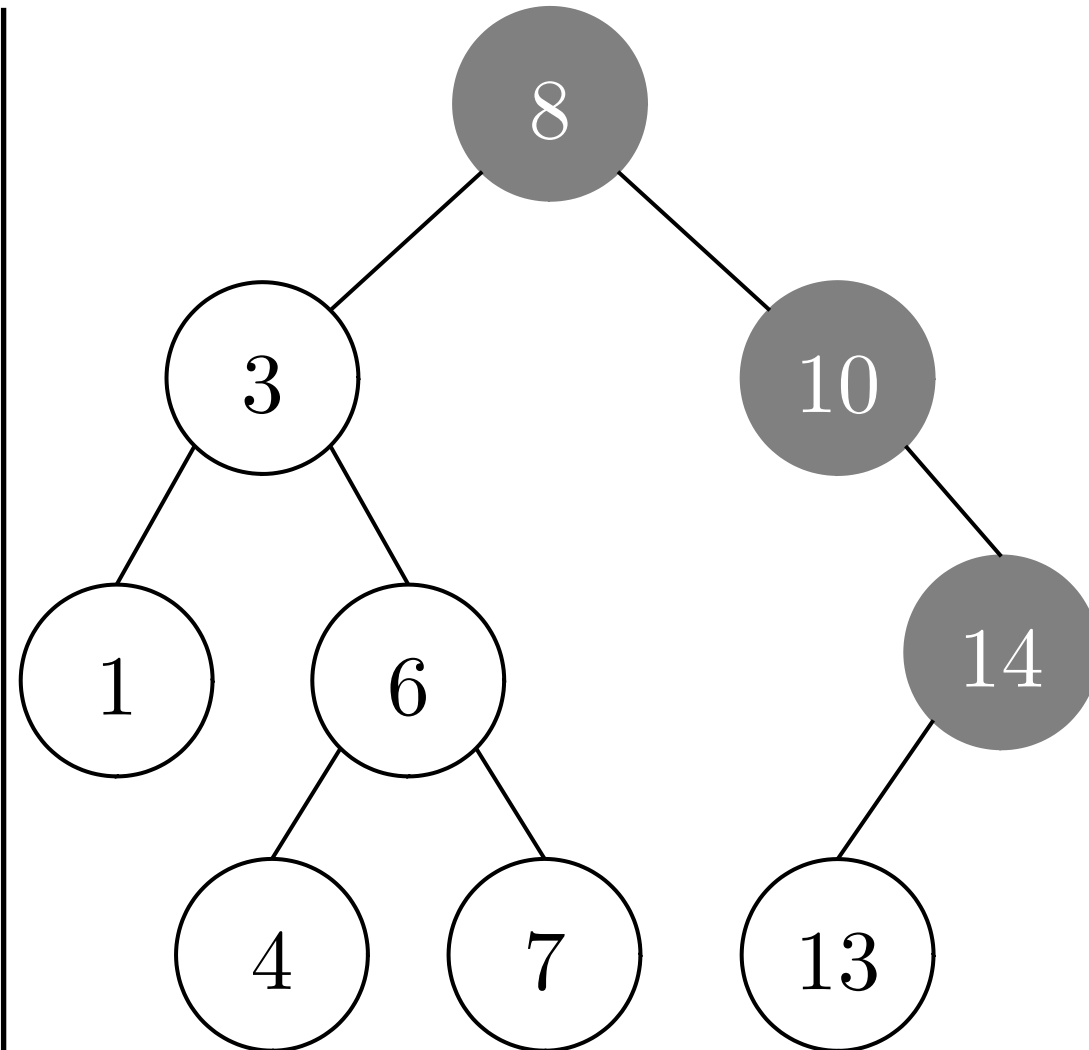
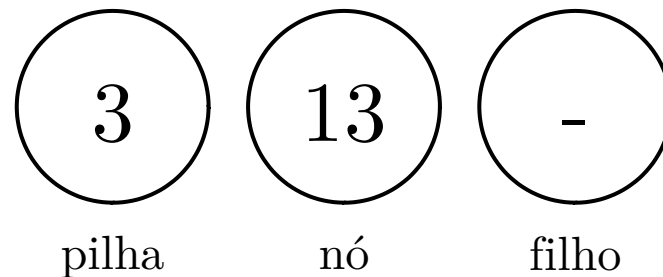
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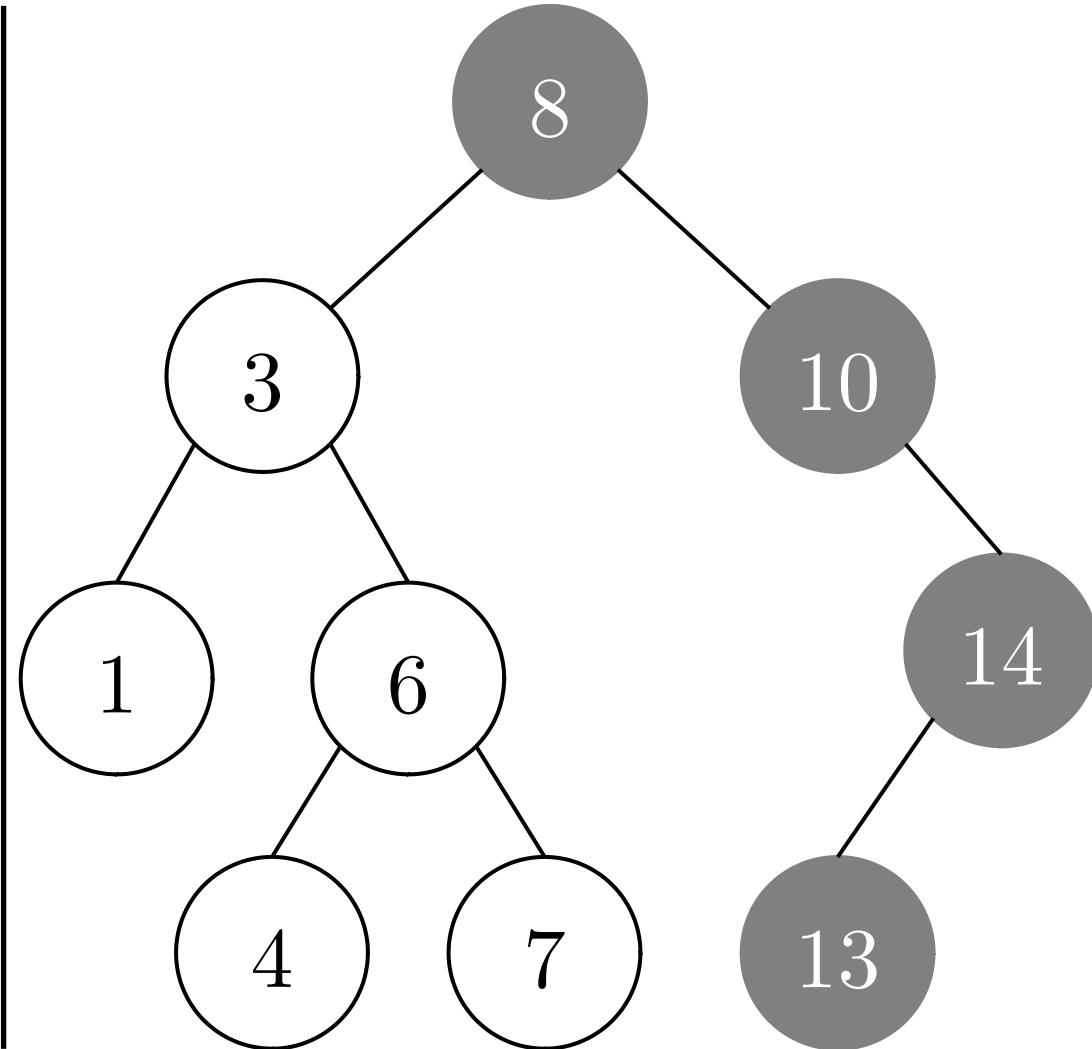
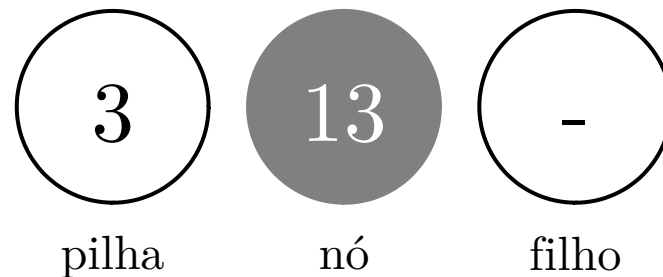
busca em profundidade

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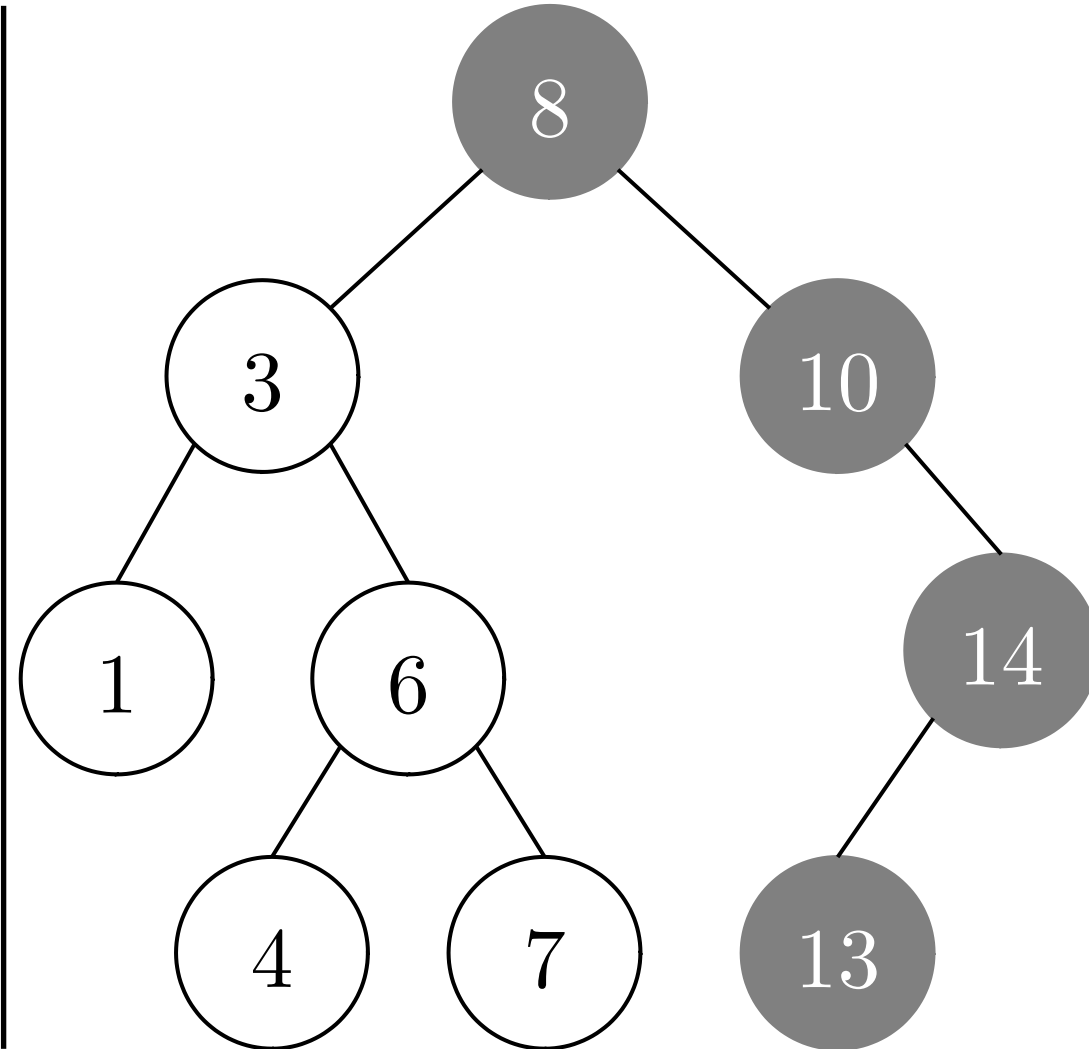
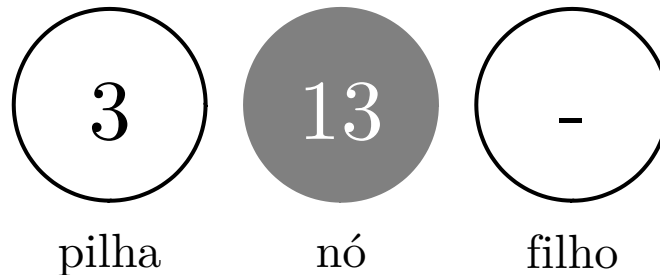
busca em profundidade

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busca em profundidade

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```



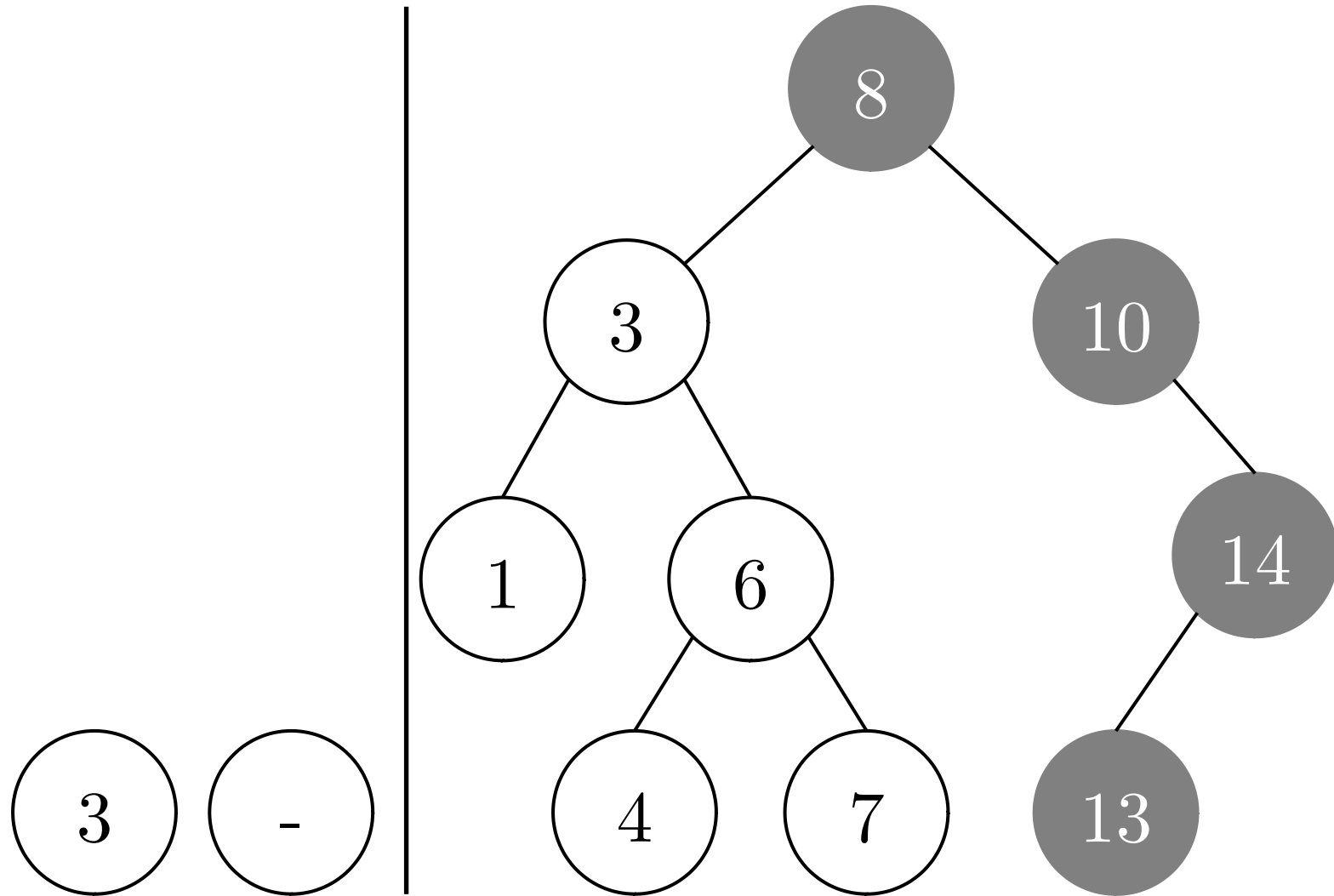
busca em profundidade

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```

pilha

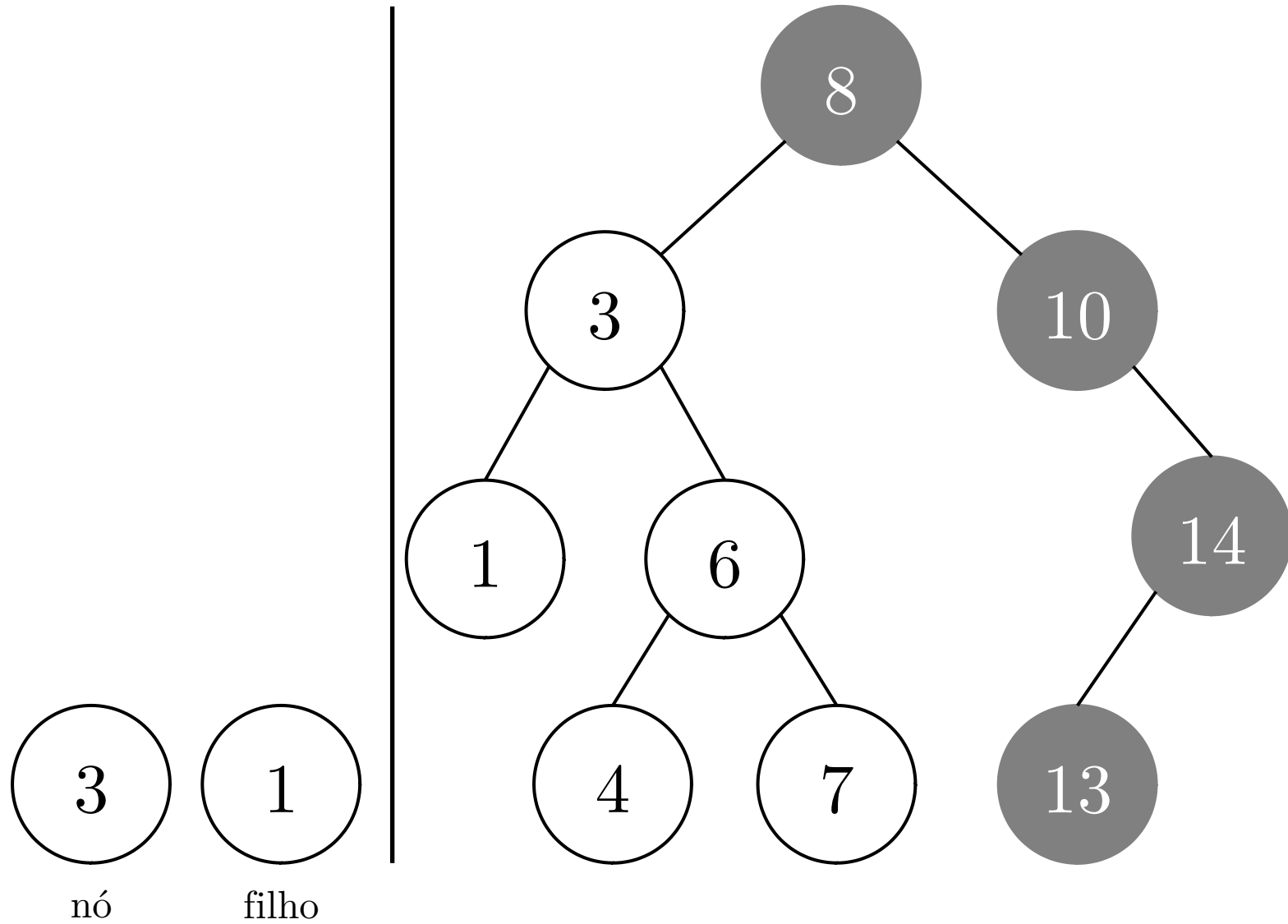
nó

filho



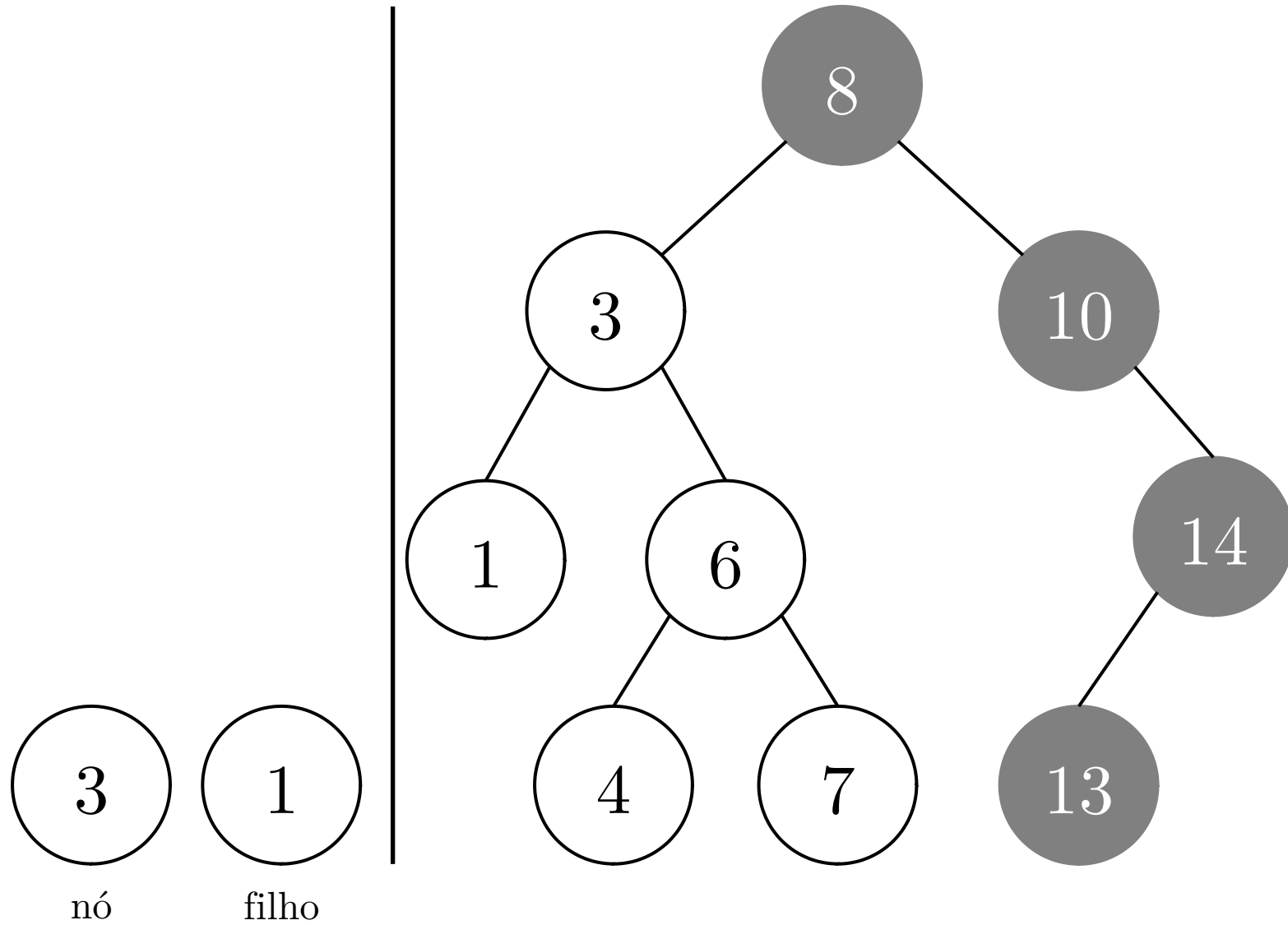
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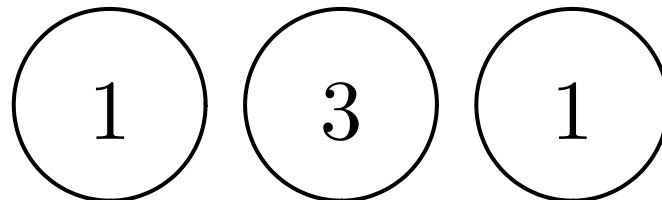
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busca em profundidade

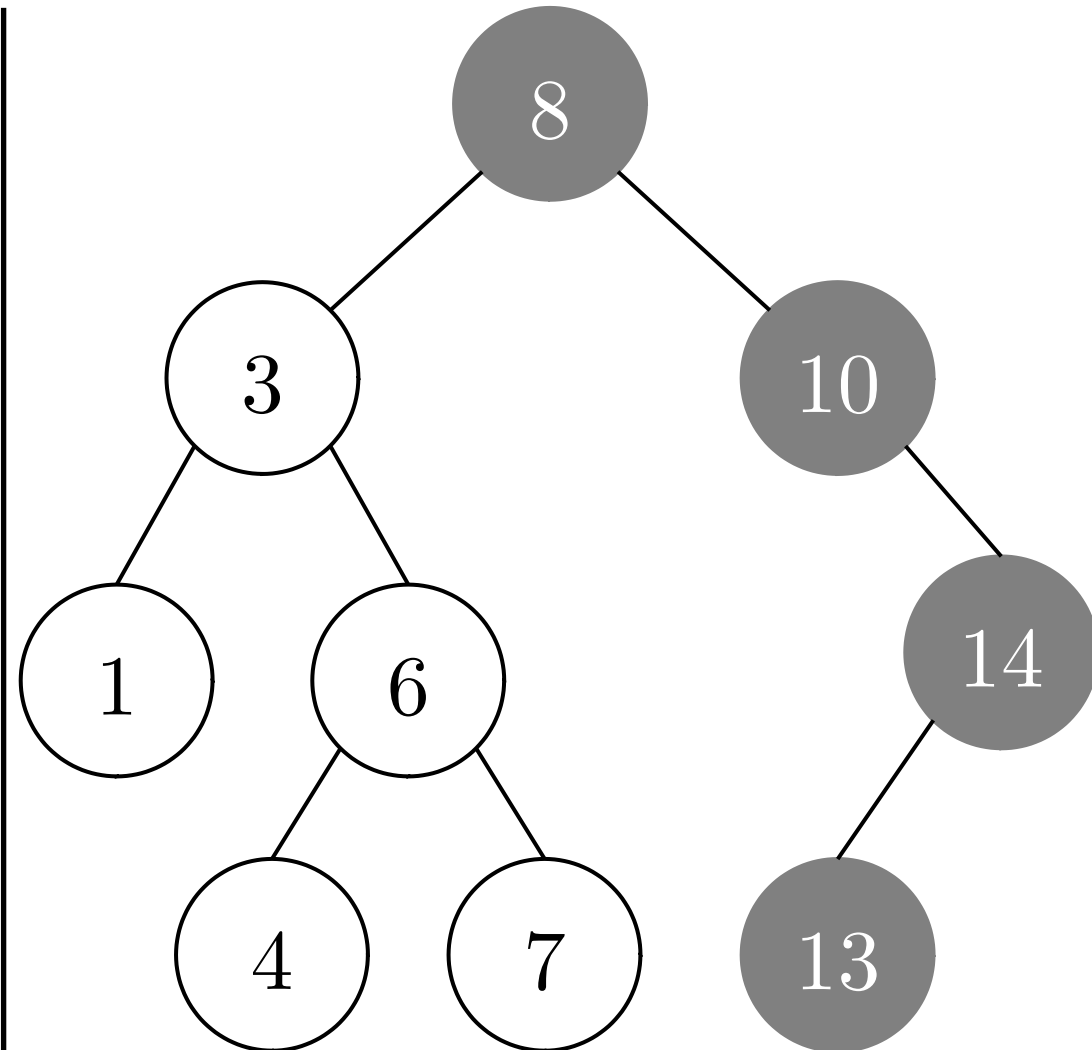
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pilha

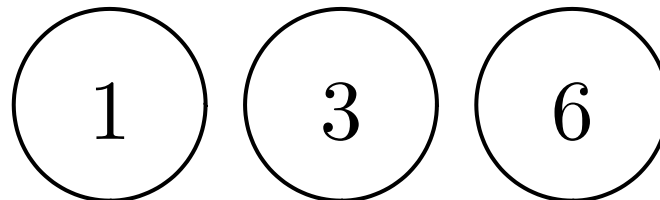
nó

filho



busca em profundidade

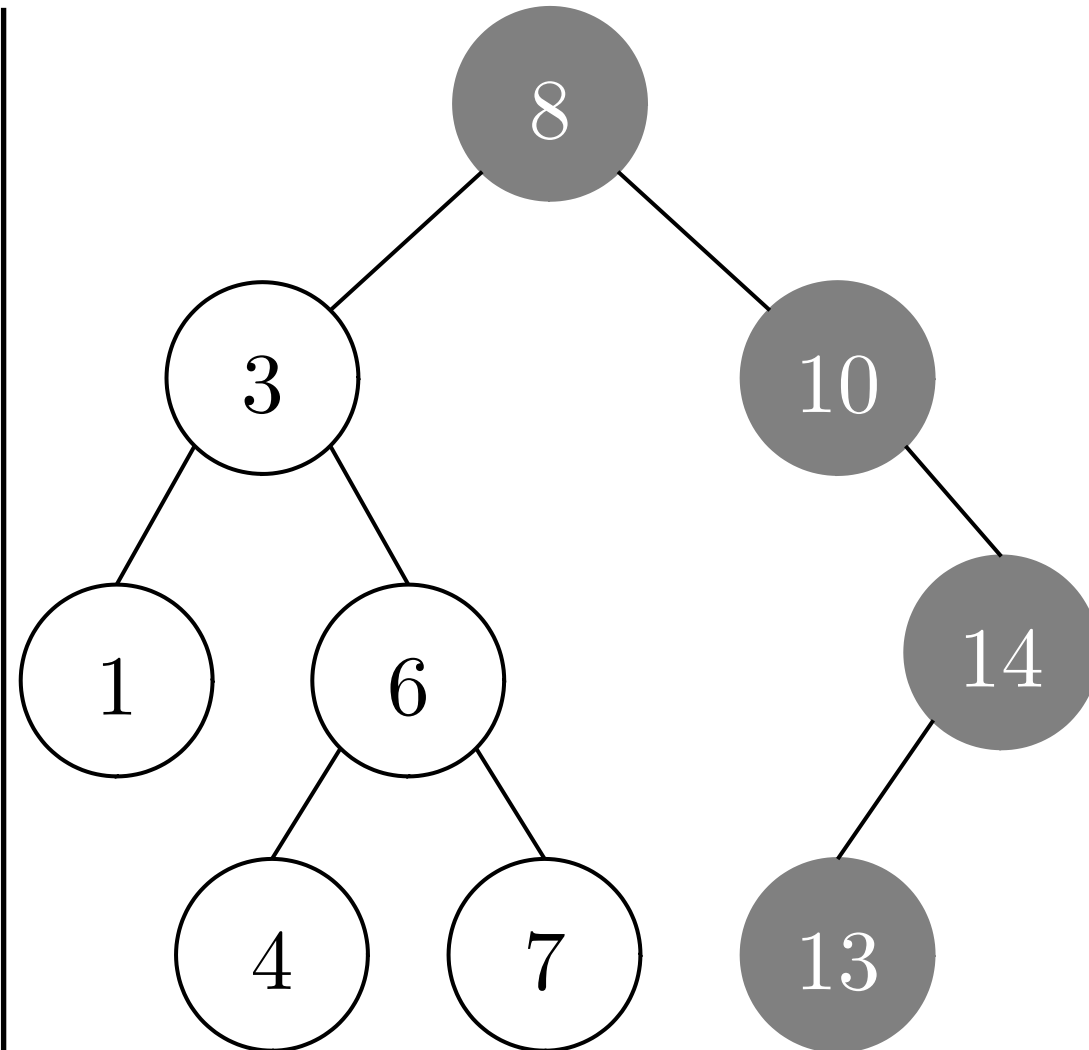
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pilha

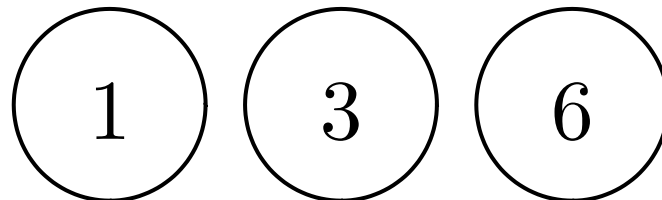
nó

filho



busca em profundidade

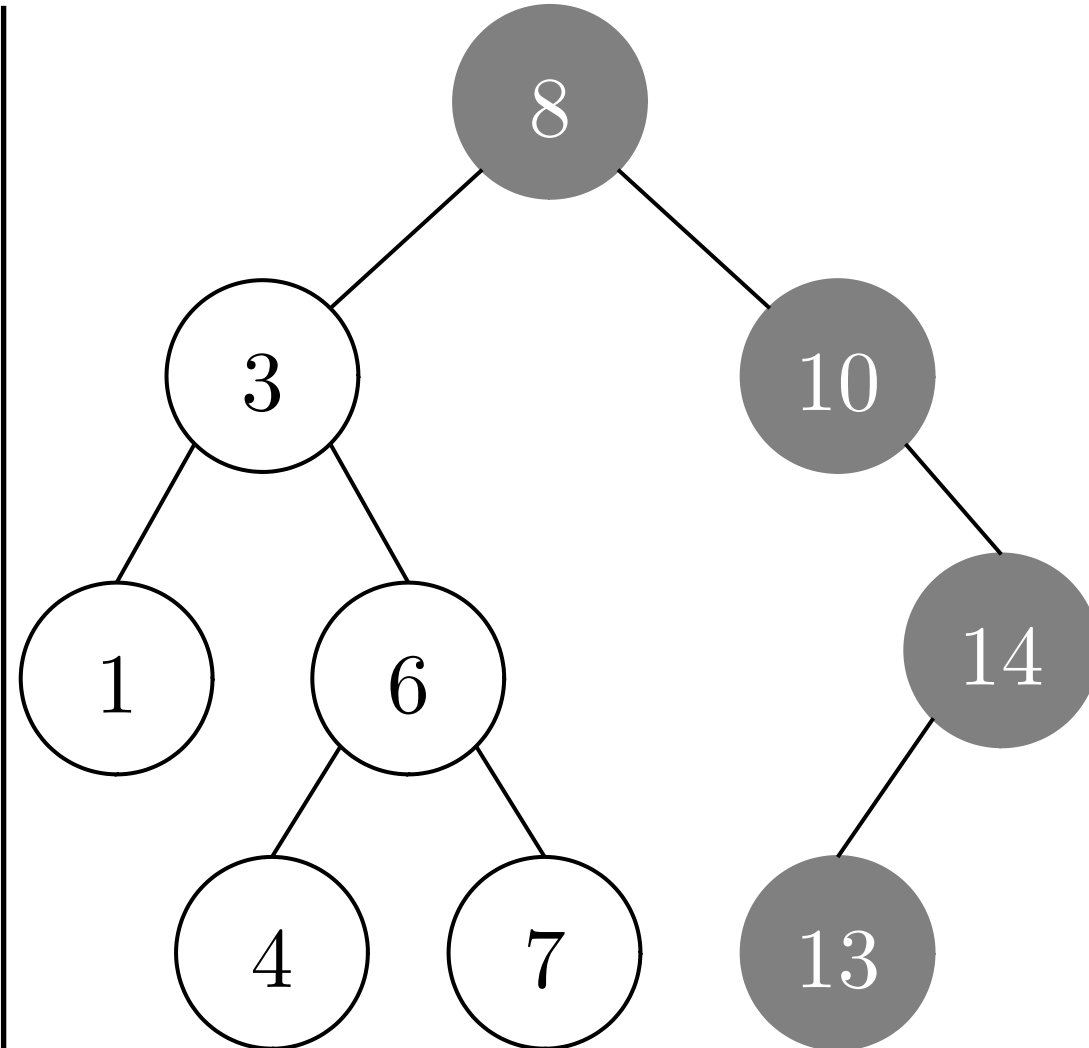
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pilha

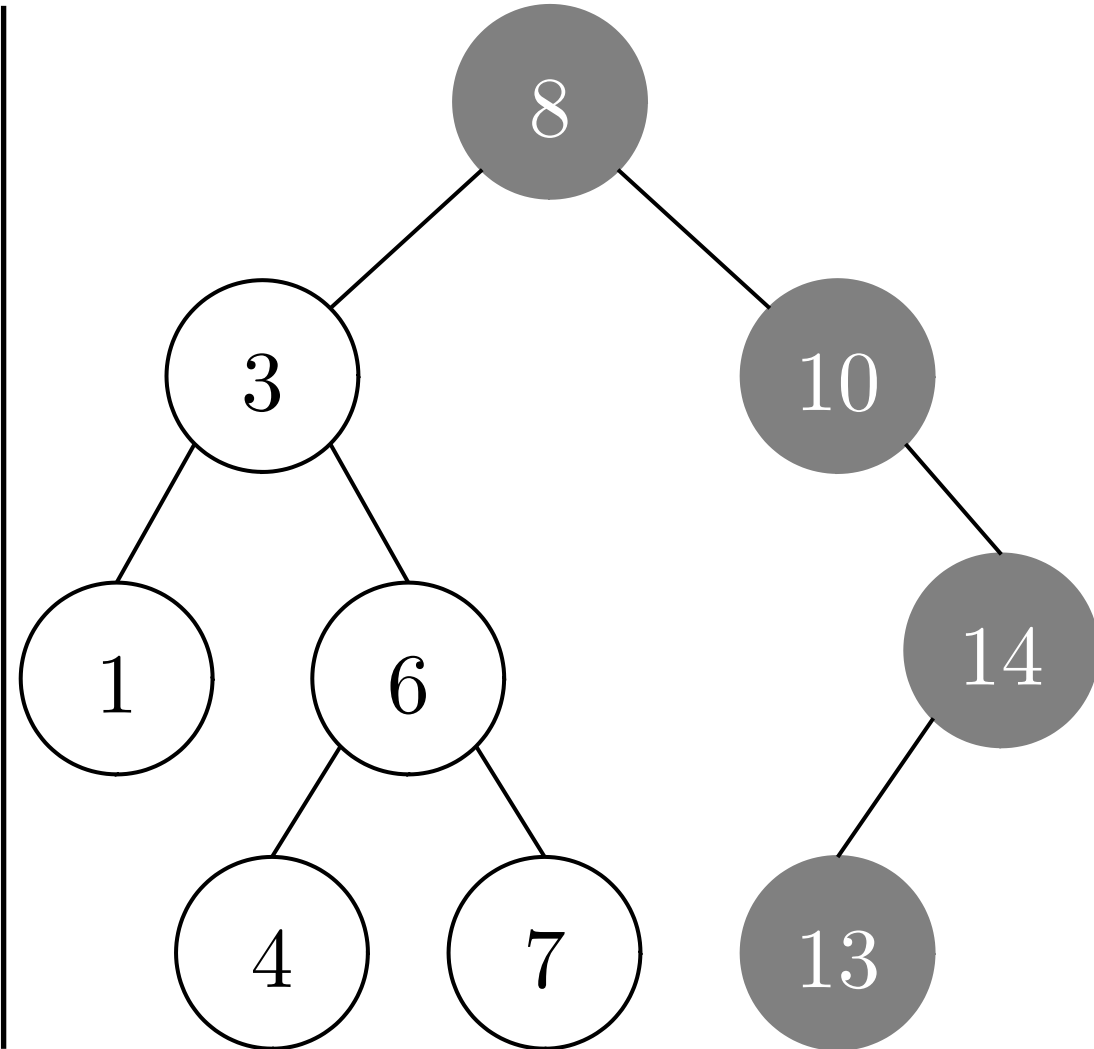
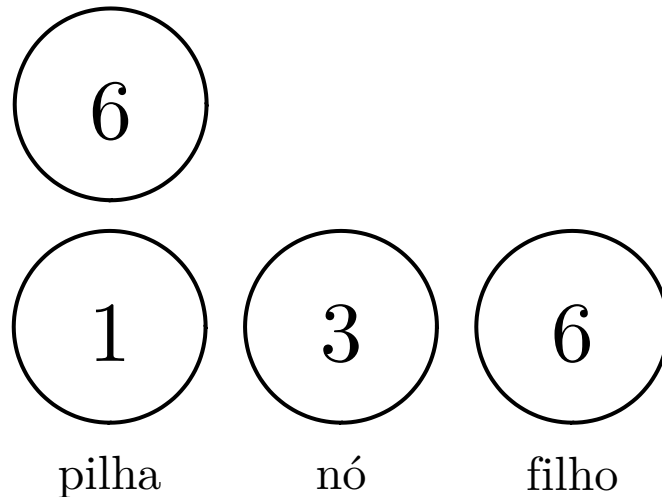
nó

filho



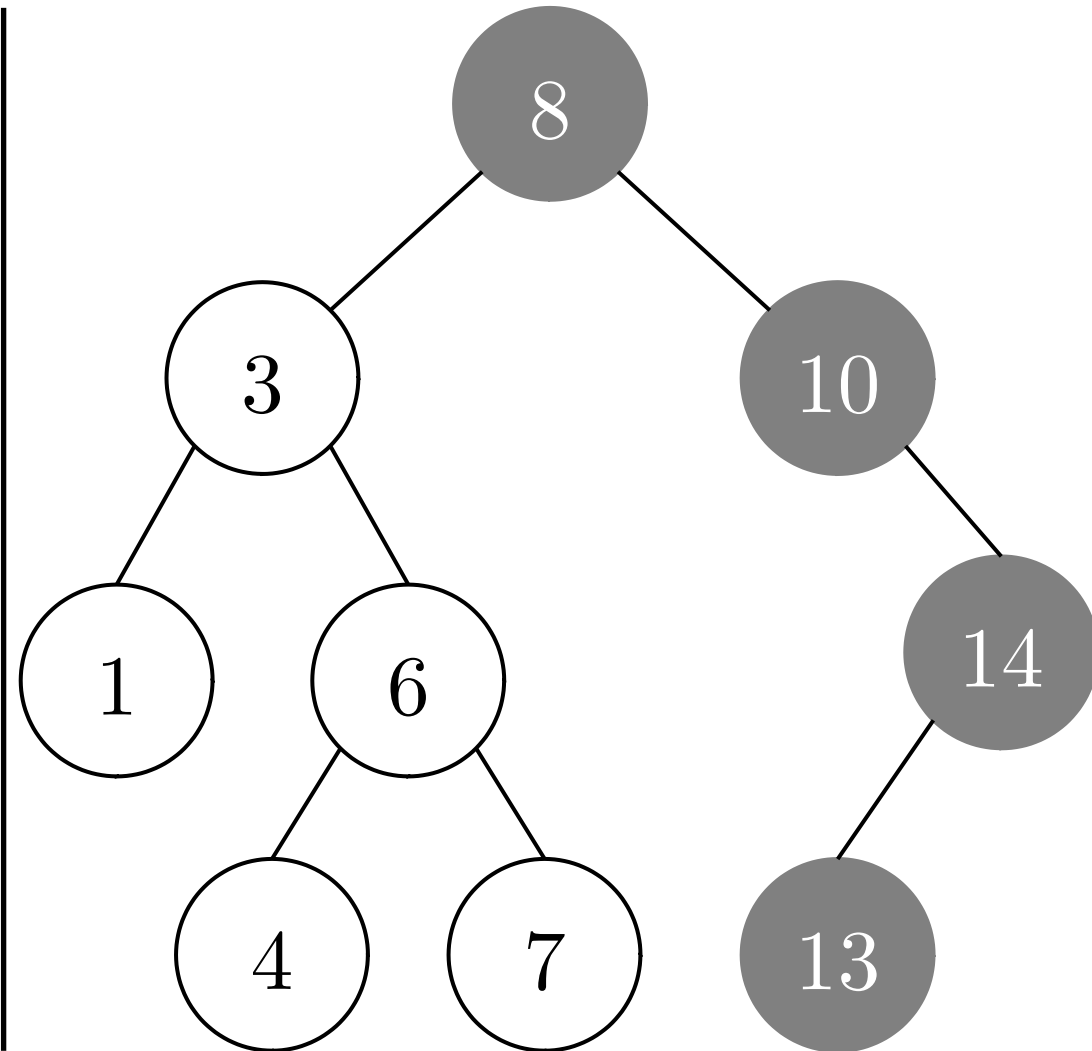
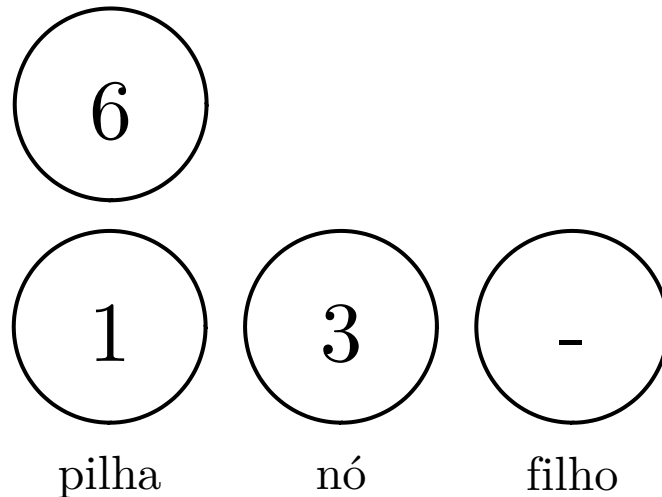
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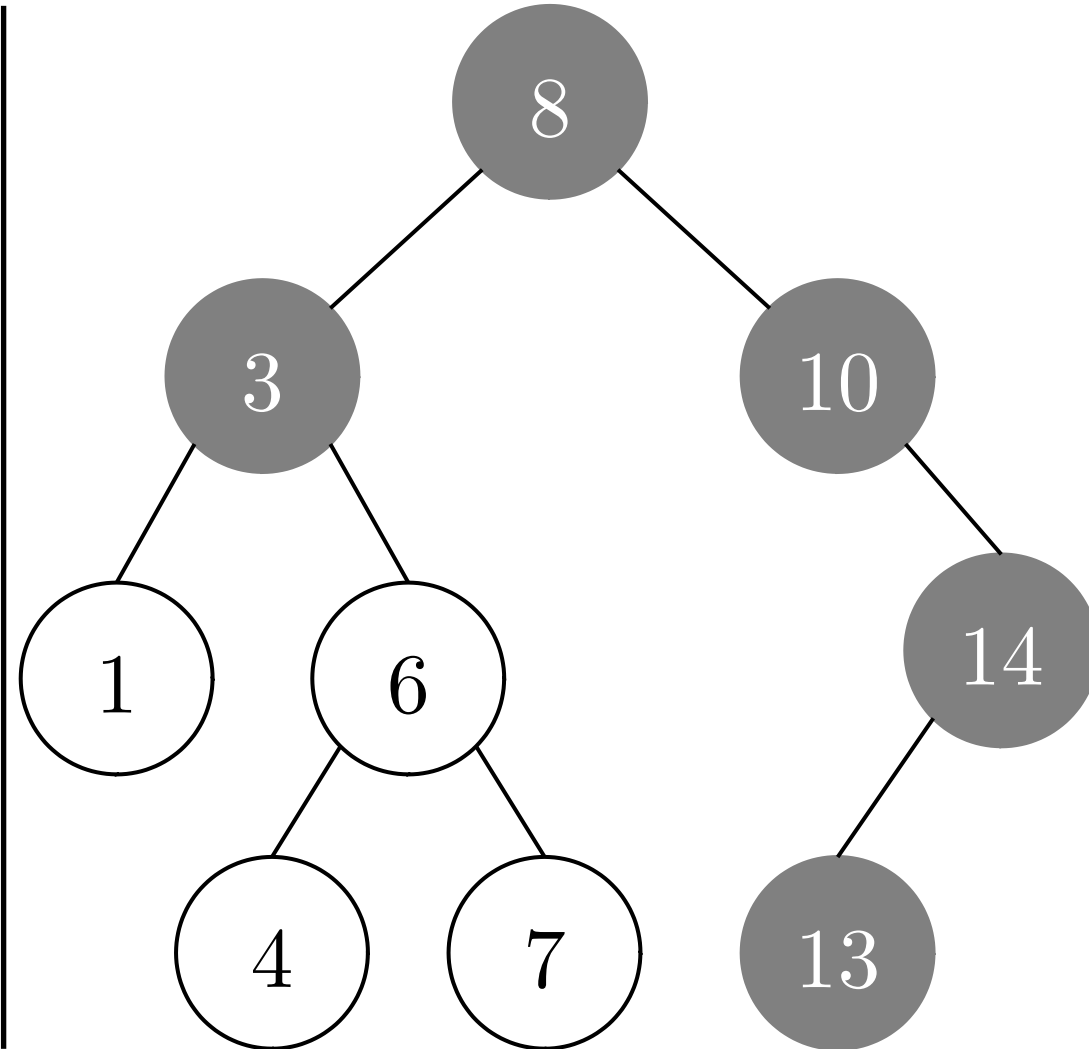
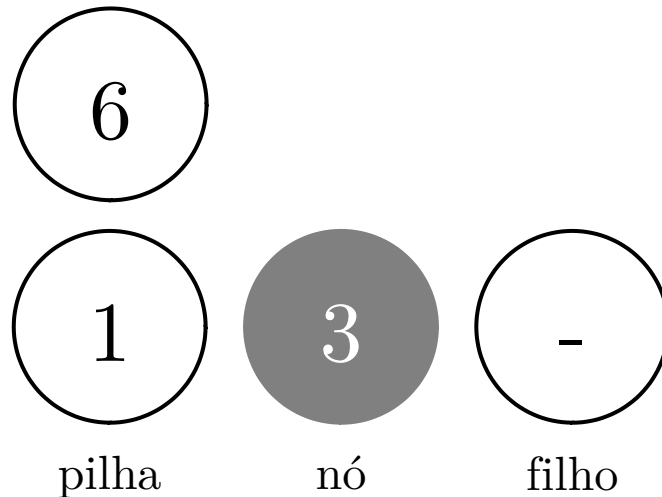
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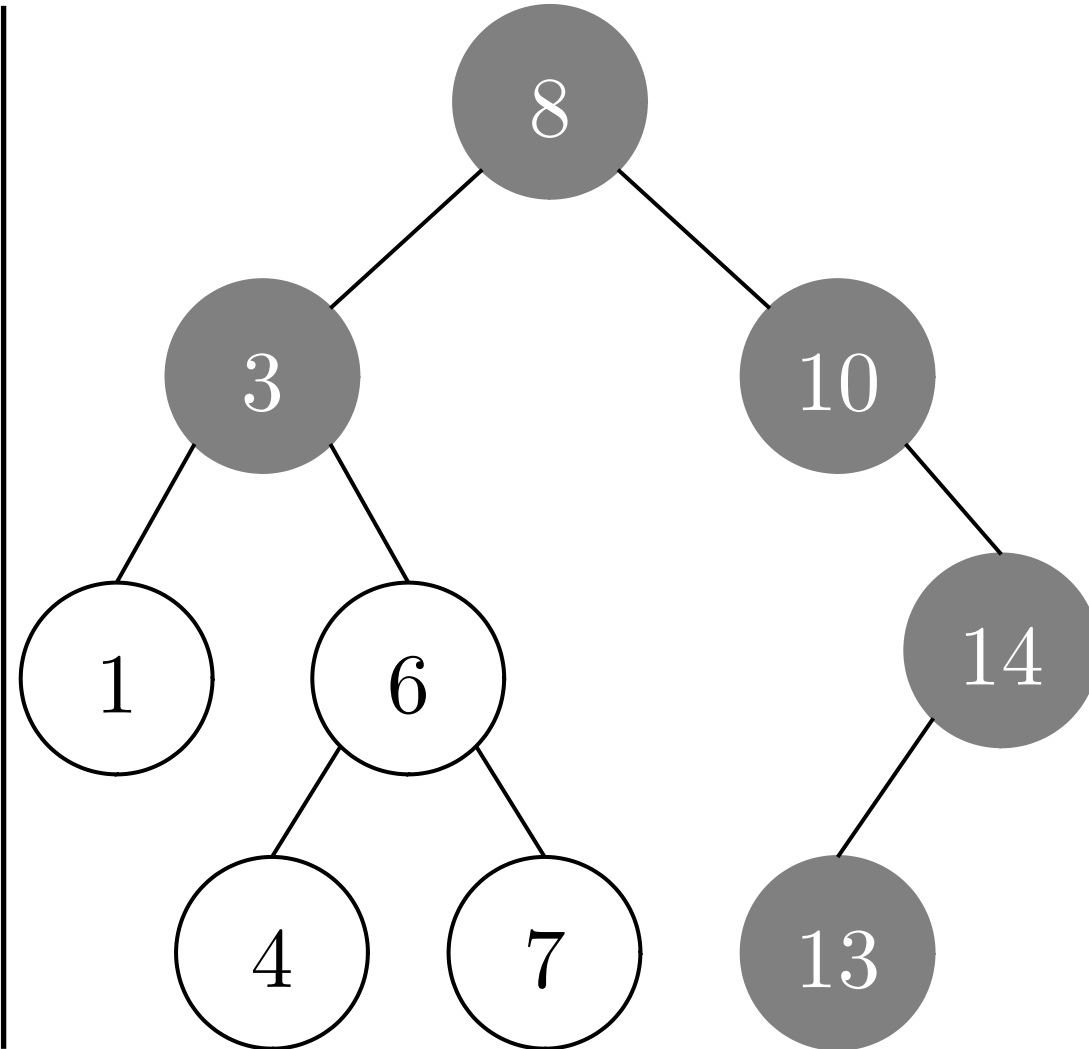
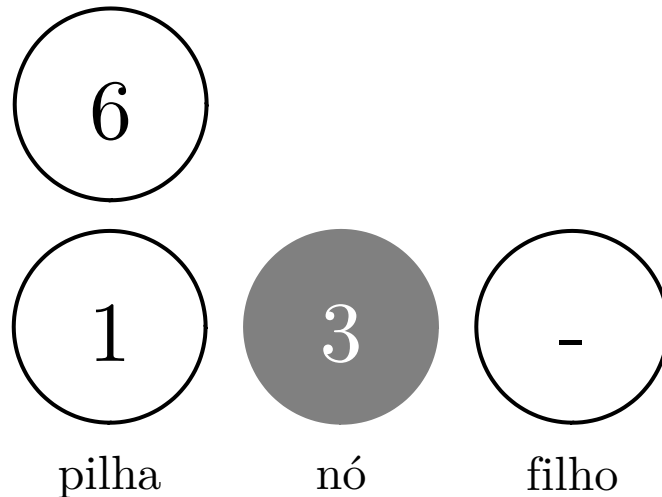
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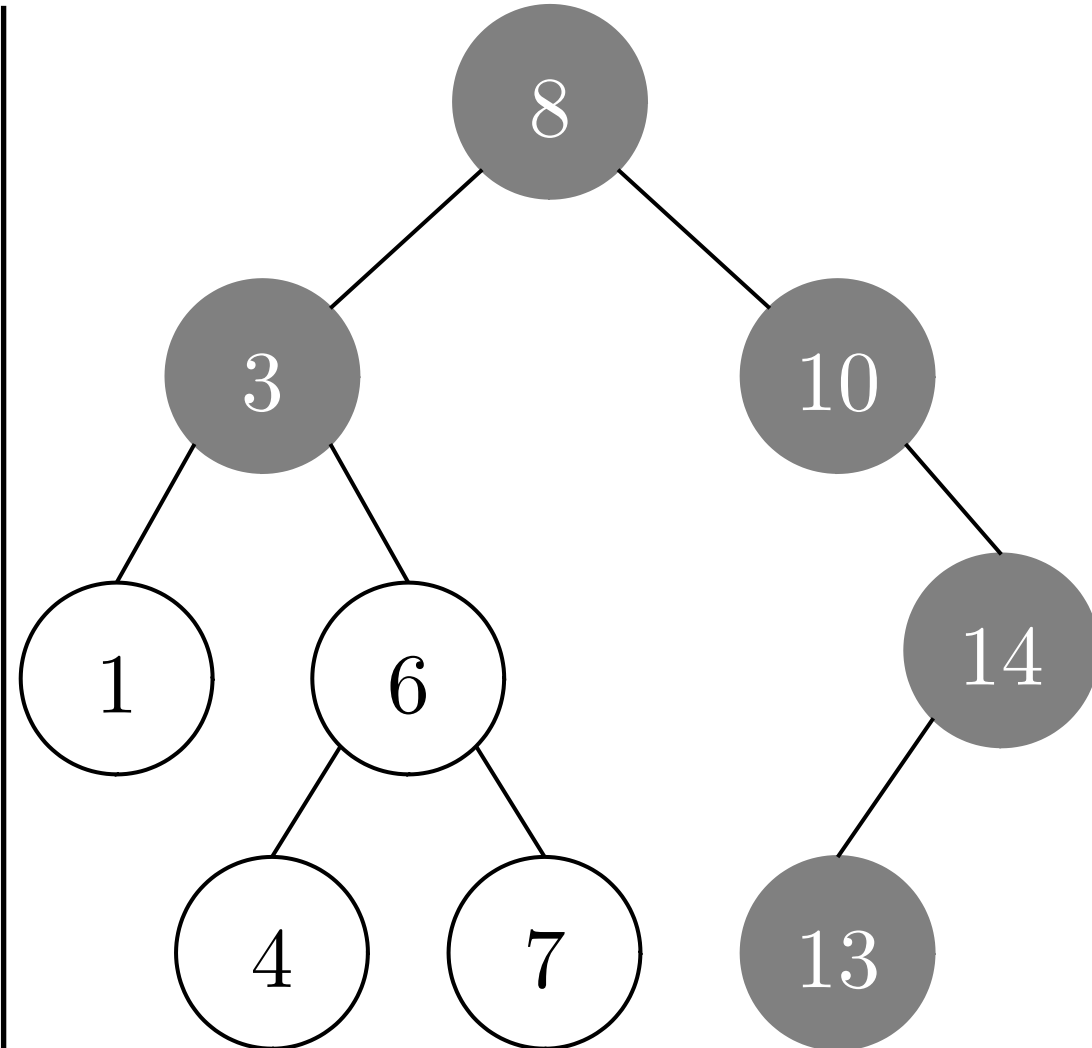
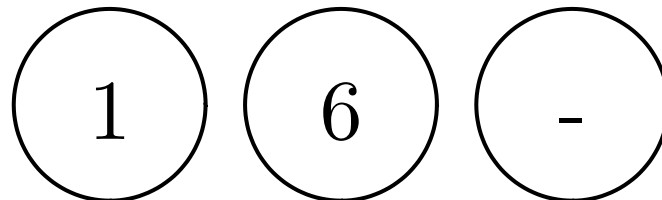
busca em profundidade

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        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



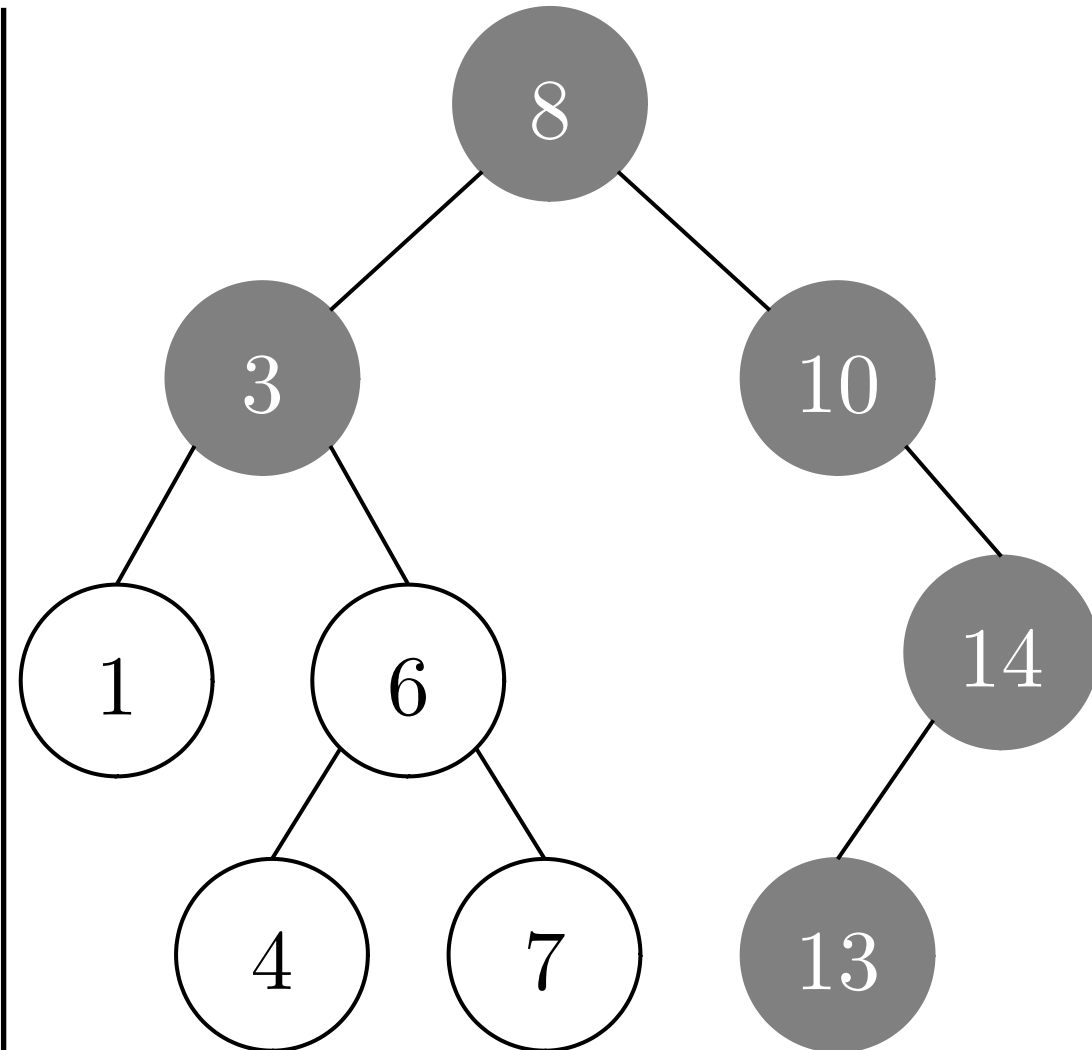
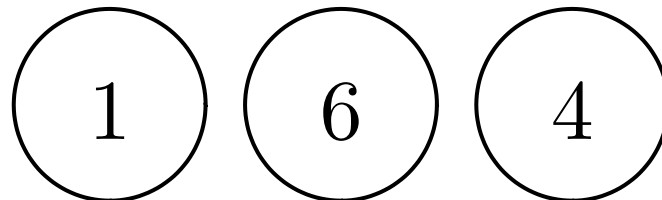
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        → nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
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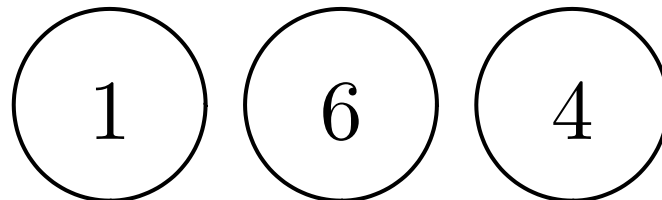
busca em profundidade

```
def dfs(nó_inicial):  
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    while (not pilha.eh_vazia()):  
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            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



busca em profundidade

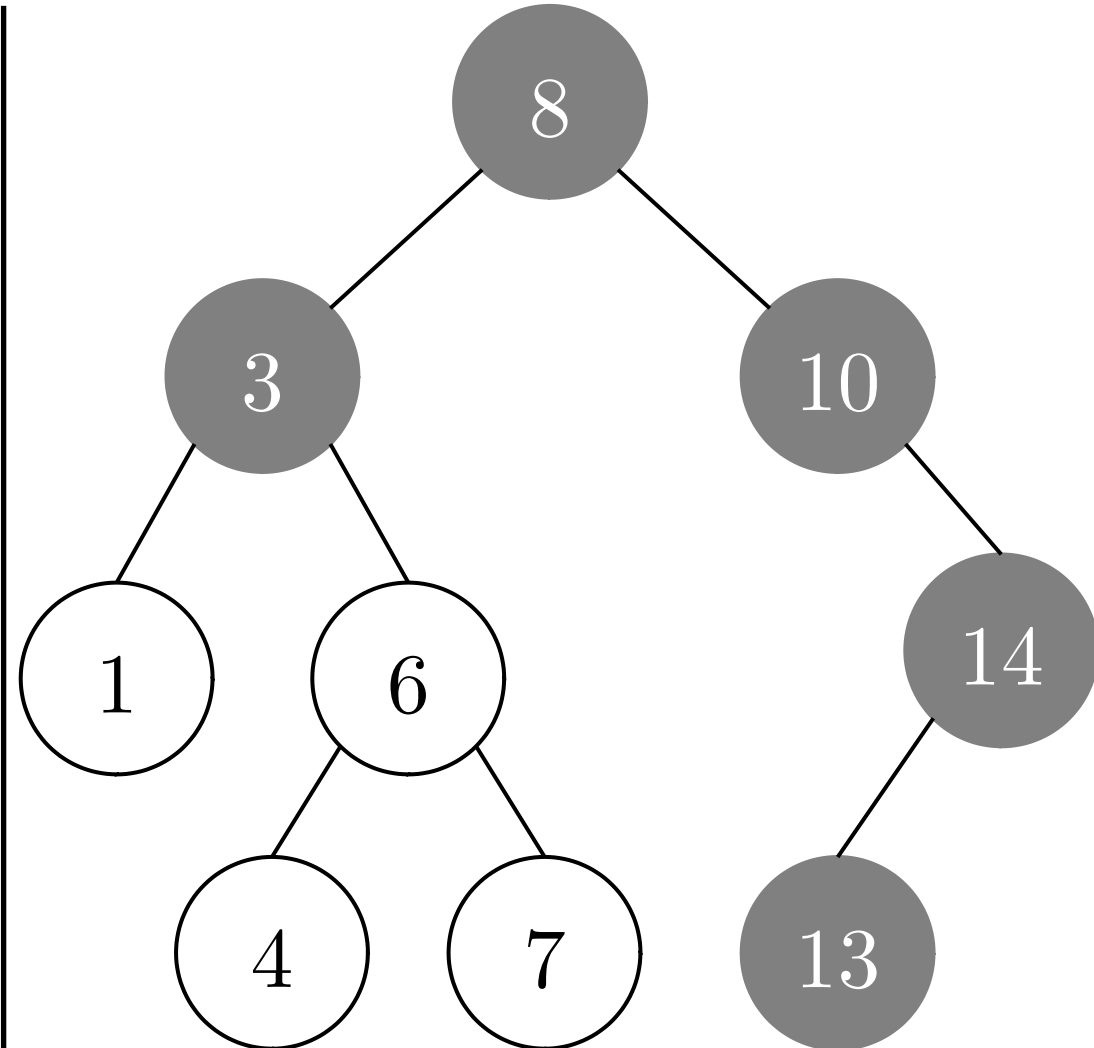
```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
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        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



pilha

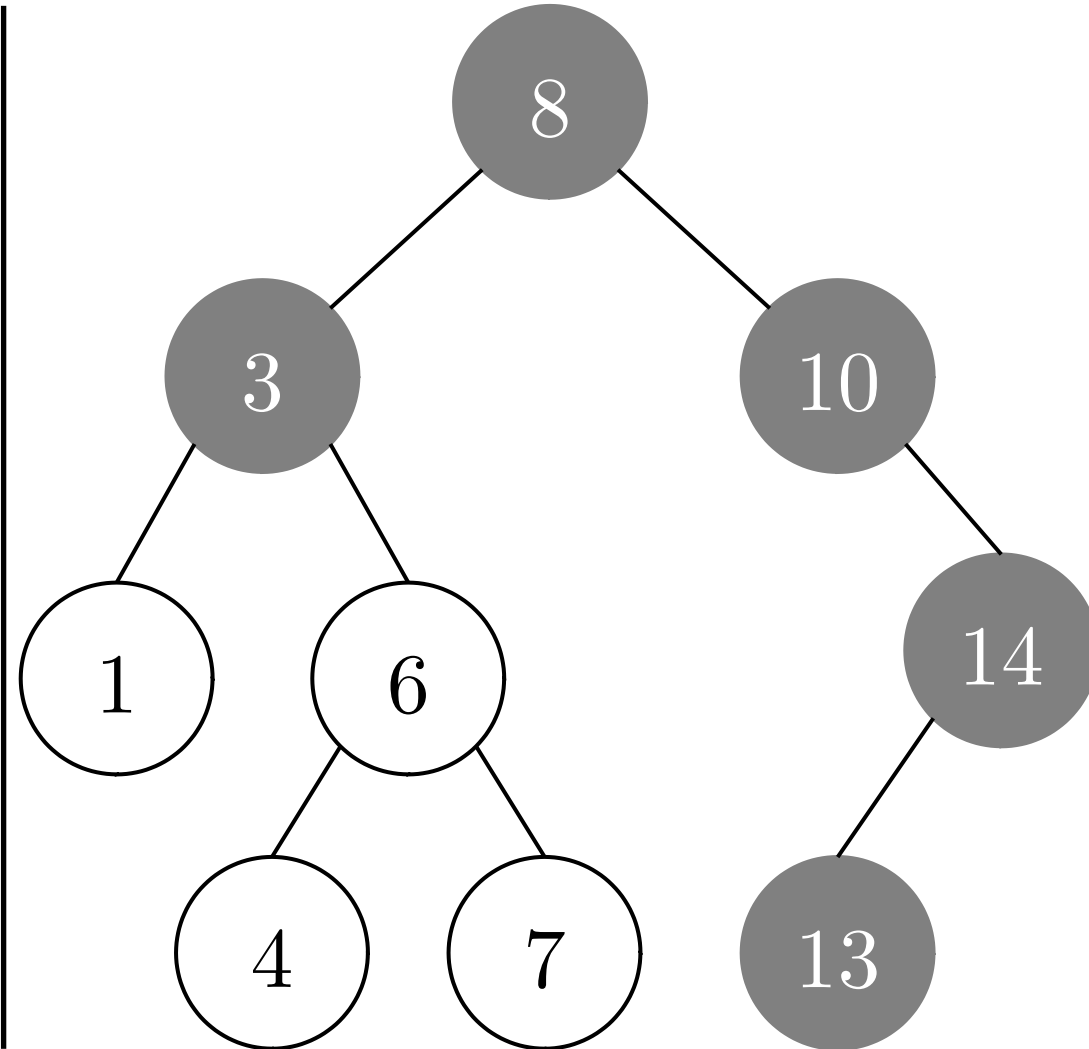
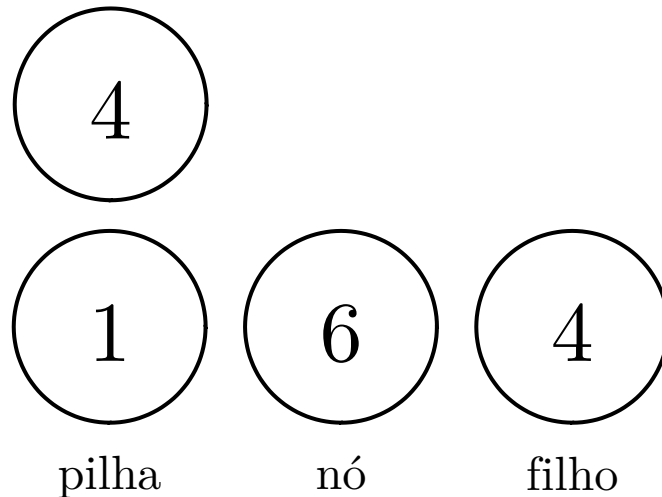
nó

filho



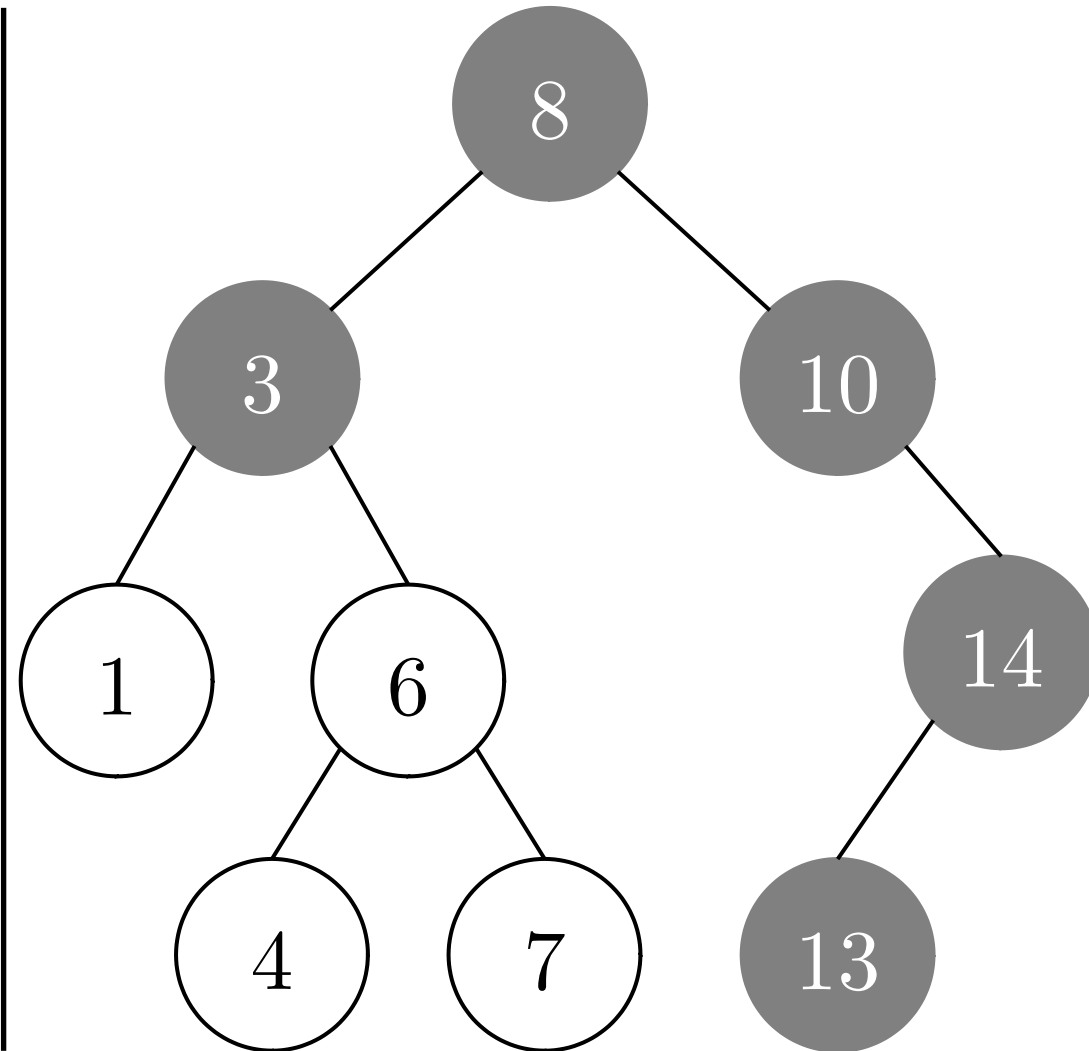
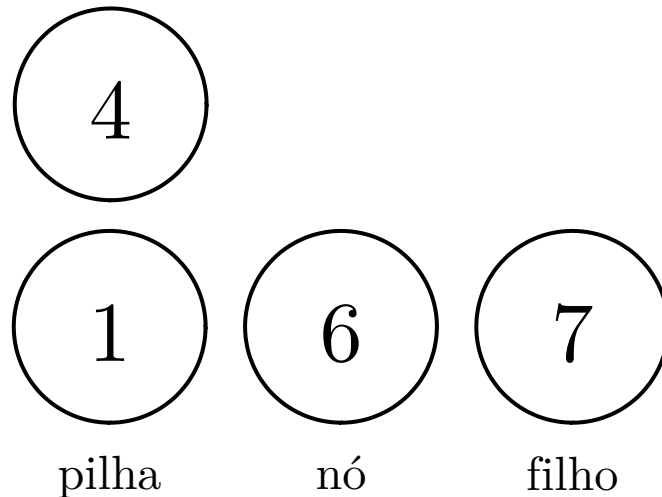
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
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                pilha.empilhar(filho)  
        nó.visitado = True
```



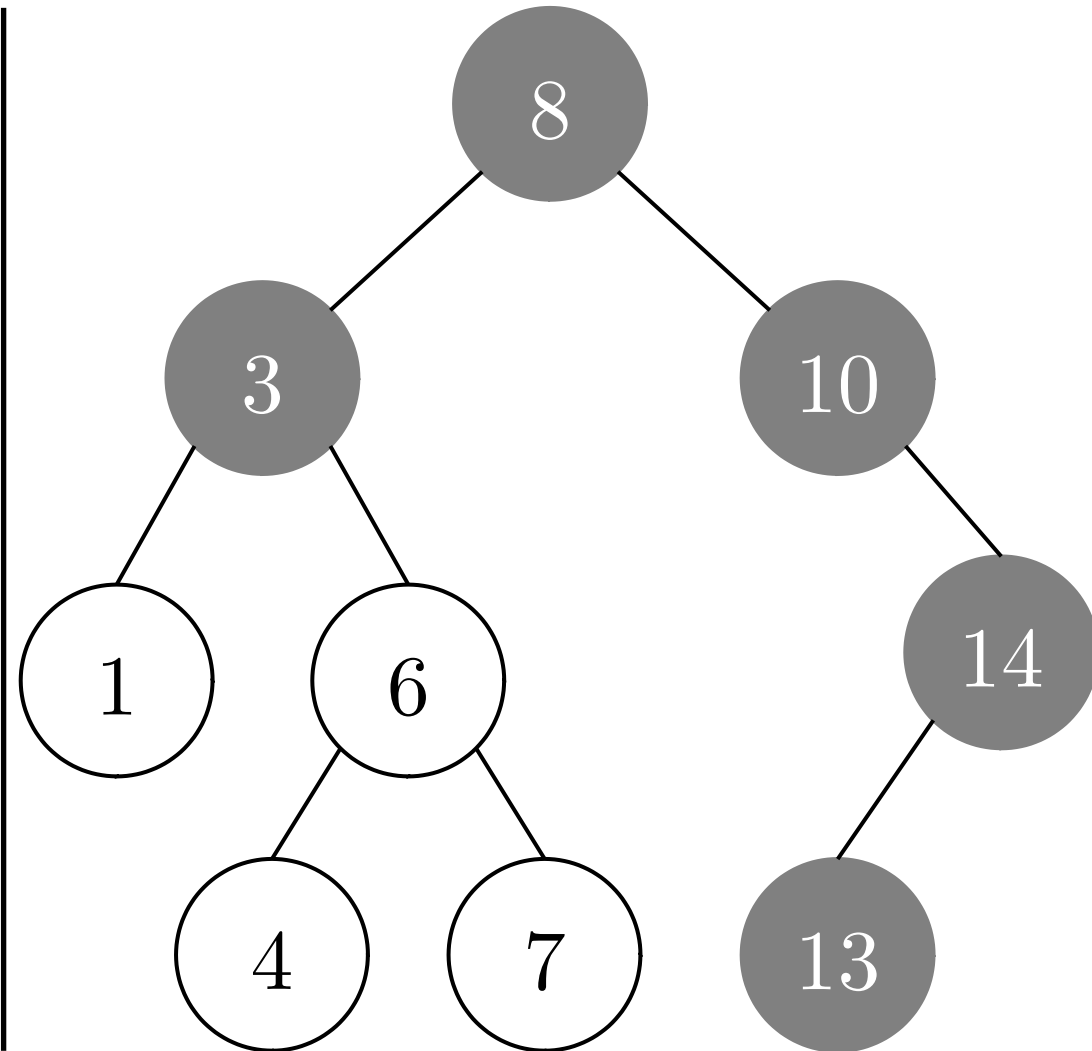
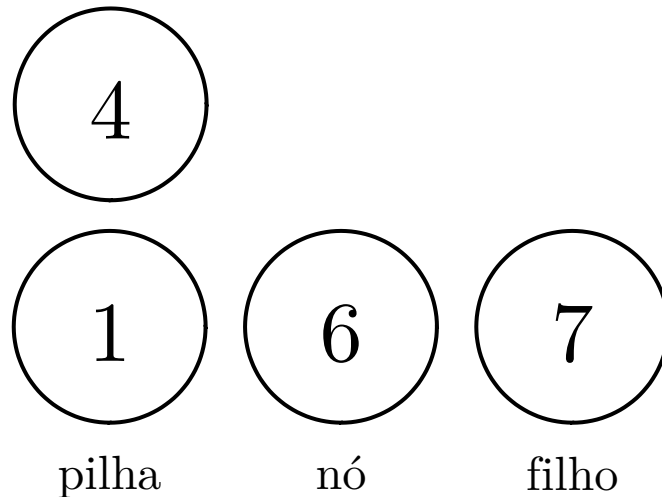
busca em profundidade

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def dfs(nó_inicial):  
    pilha = Pilha()  
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    while (not pilha.eh_vazia()):  
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```



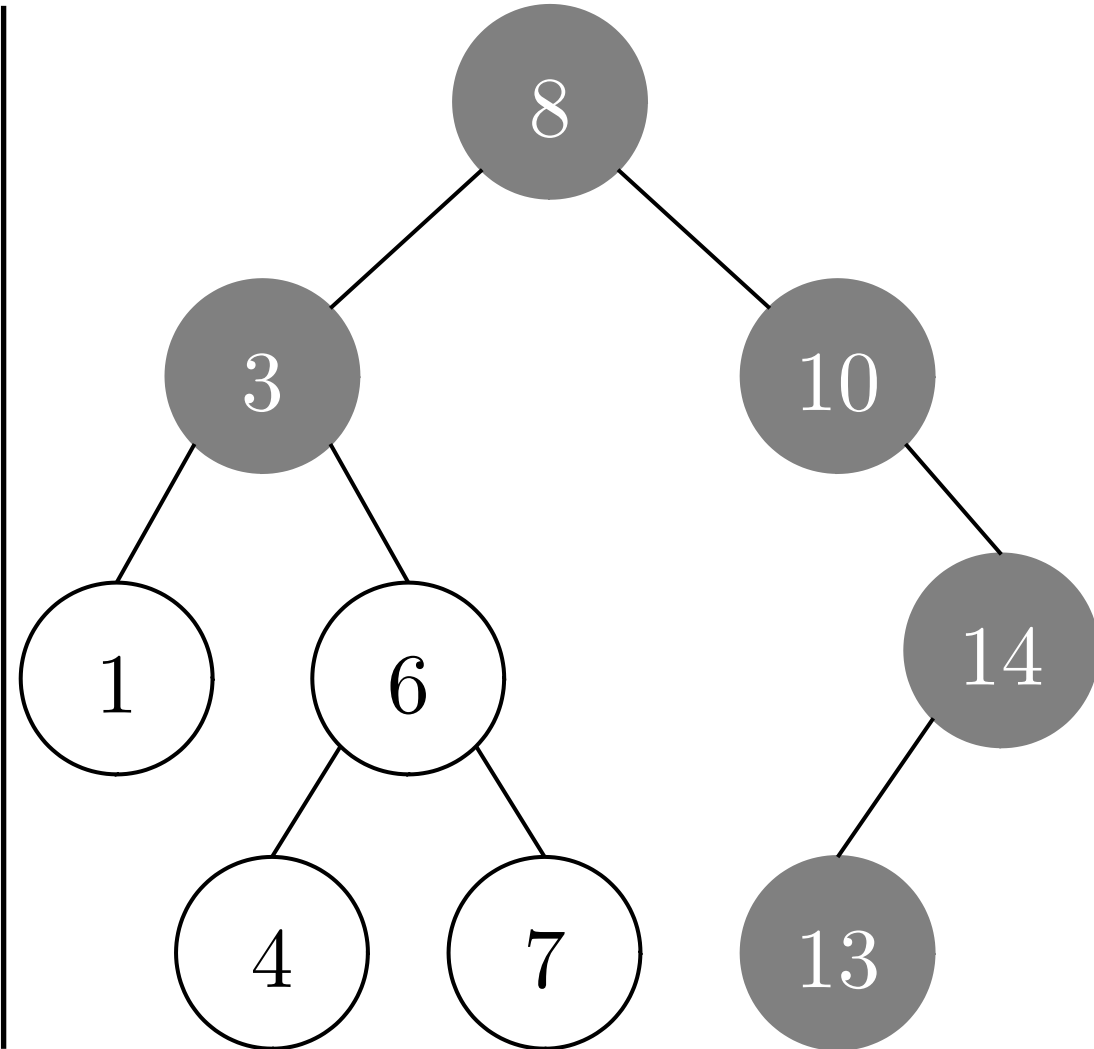
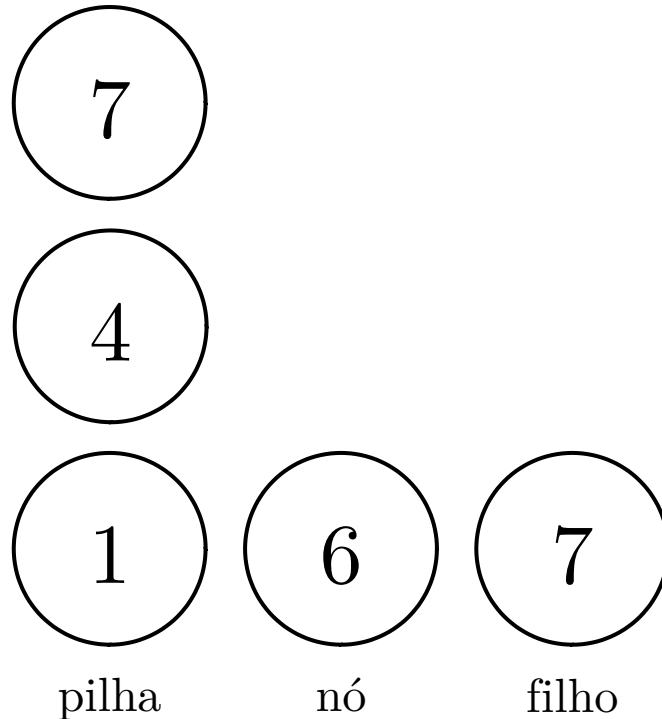
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



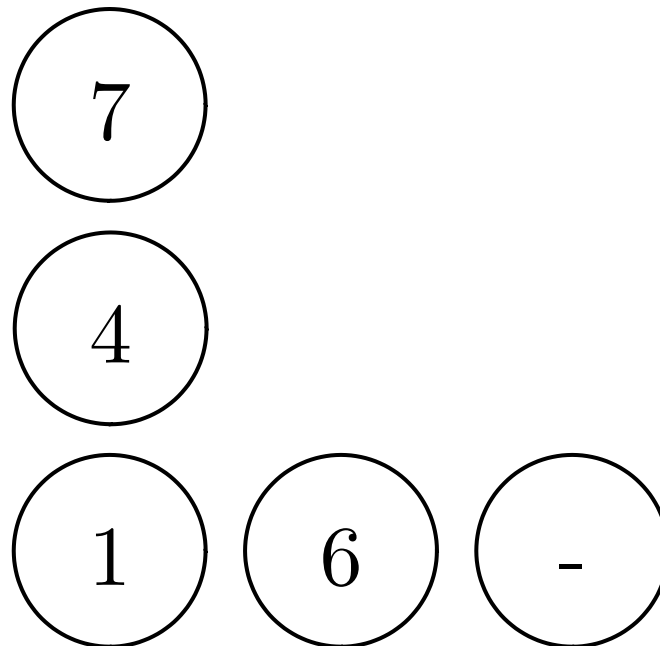
busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
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        for filho in nó.filhos():  
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                pilha.empilhar(filho)  
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```



busca em profundidade

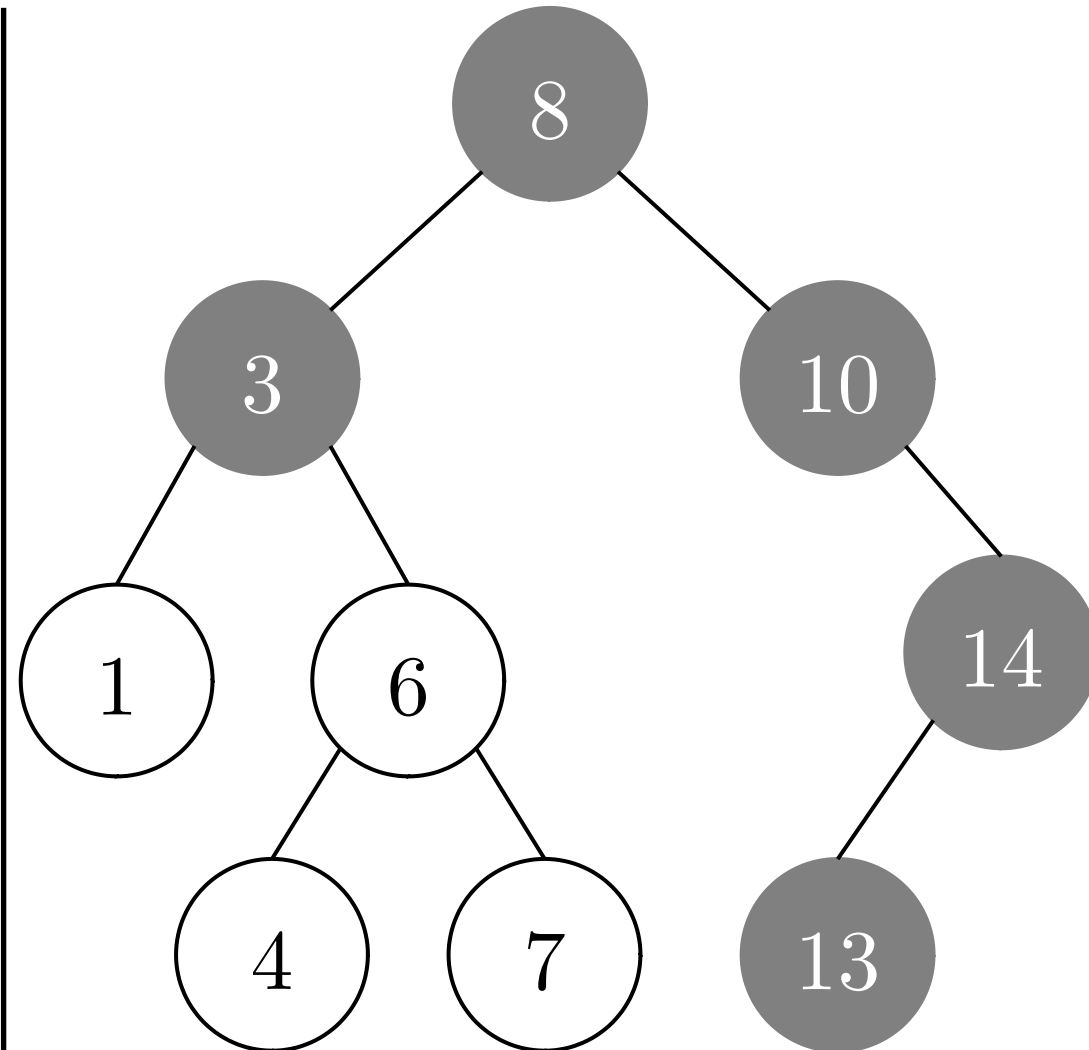
```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```



pilha

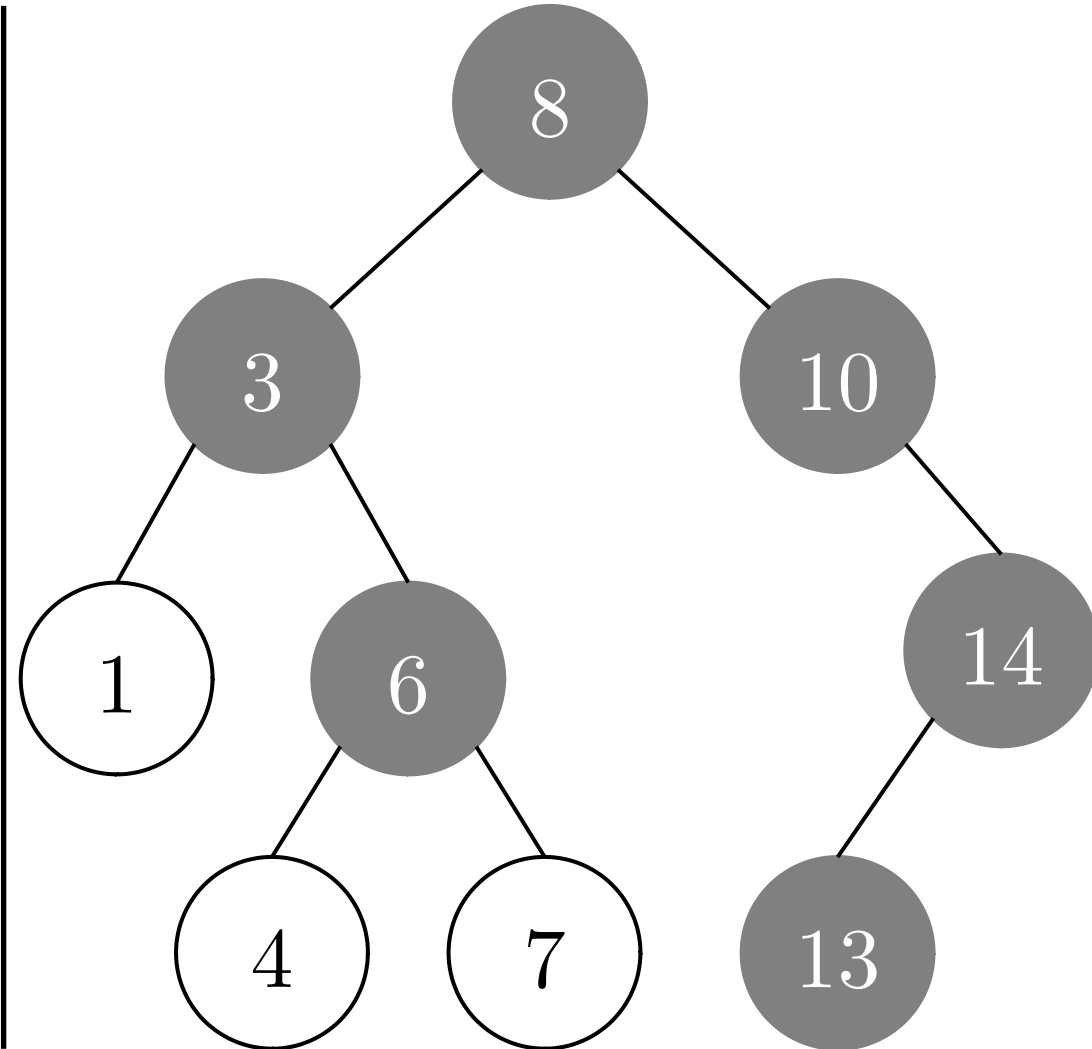
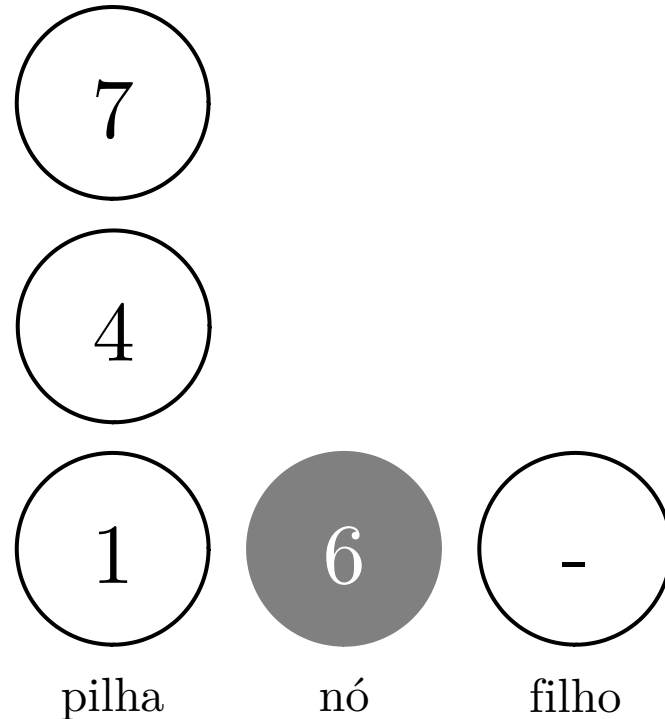
nó

filho



busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
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busca em profundidade

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                pilha.empilhar(filho)  
        nó.visitado = True
```

7

4

1

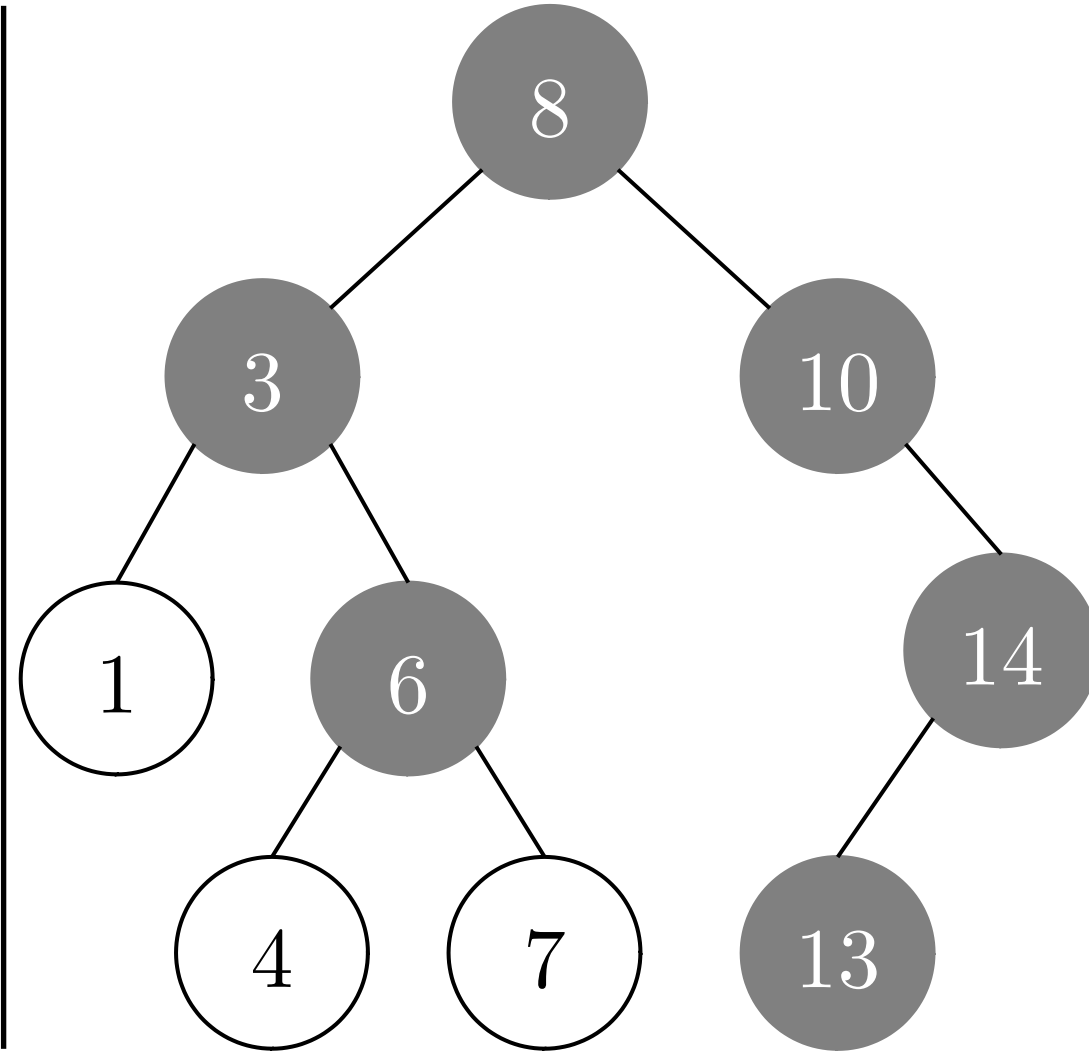
pilha

6

nó

-

filho



busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
        → nó = pilha.desempilhar()  
        for filho in nó.filhos():  
            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```

4

1

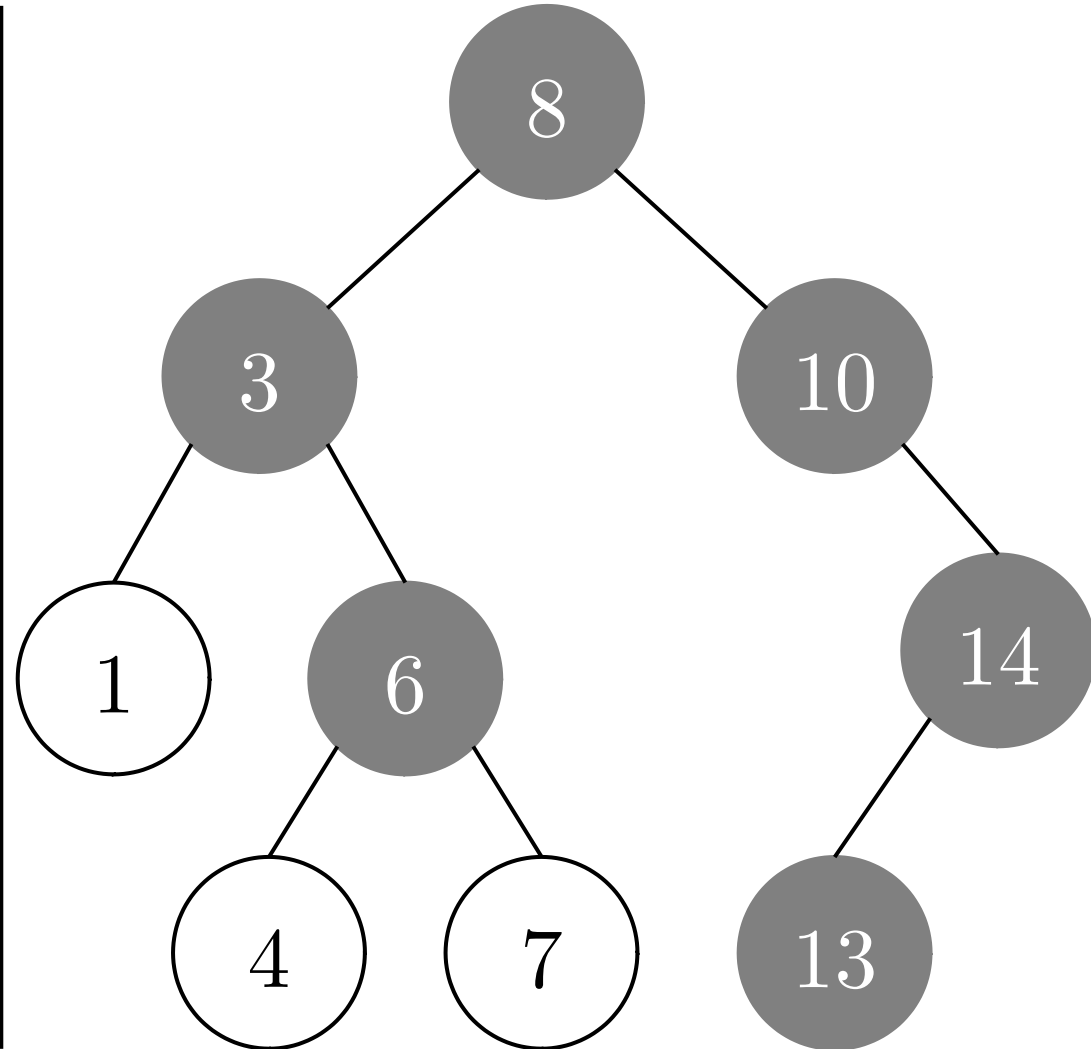
pilha

7

nó

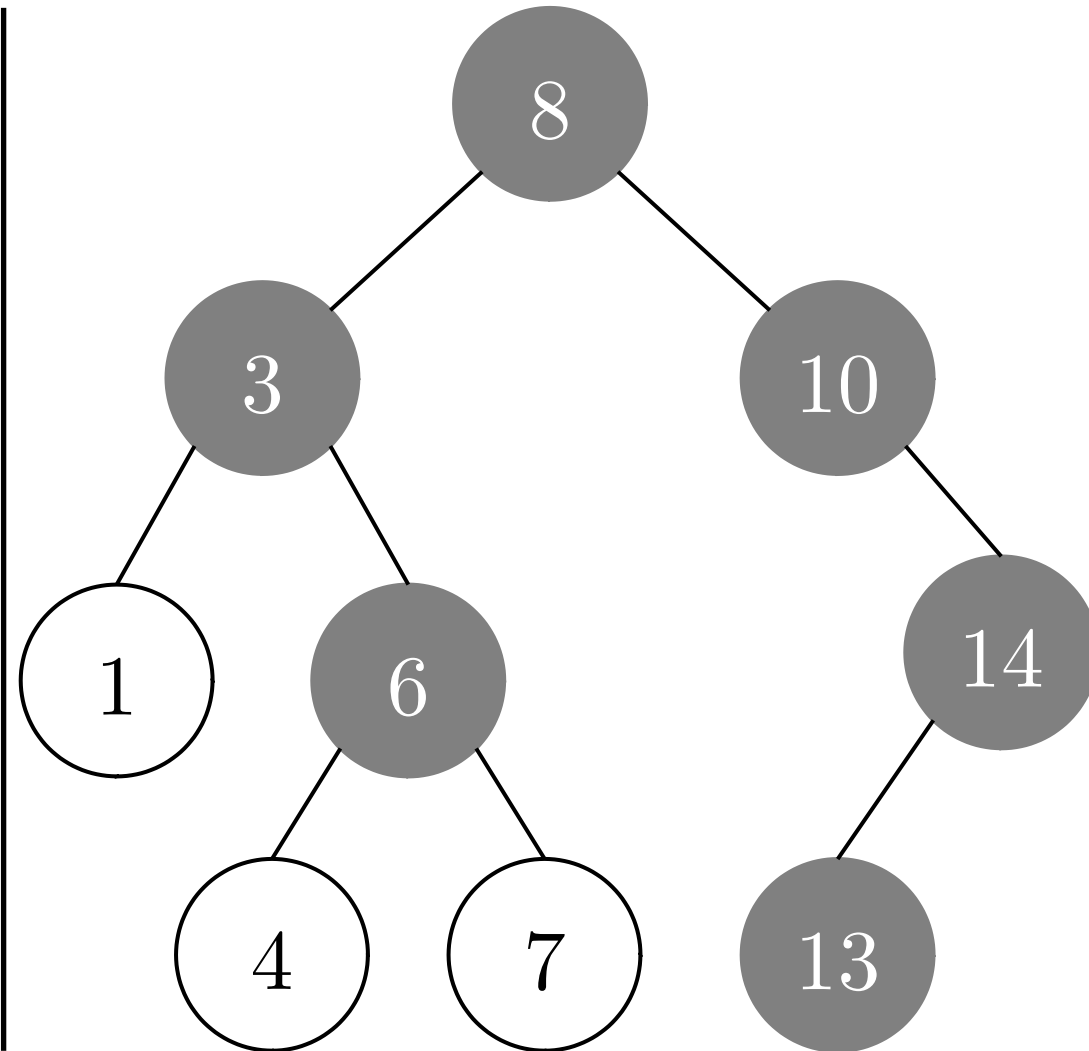
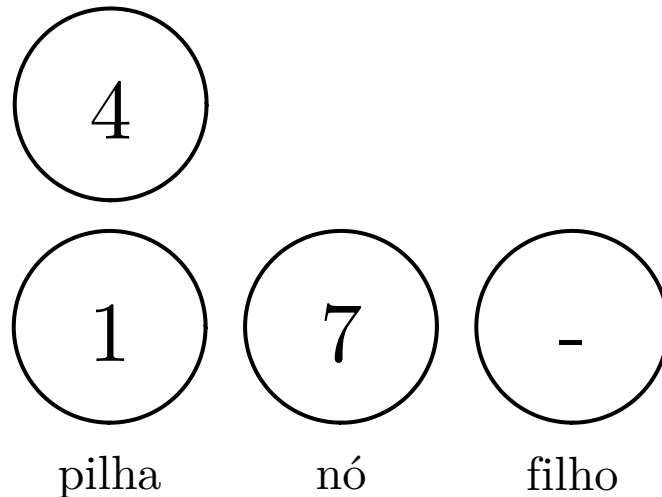
-

filho



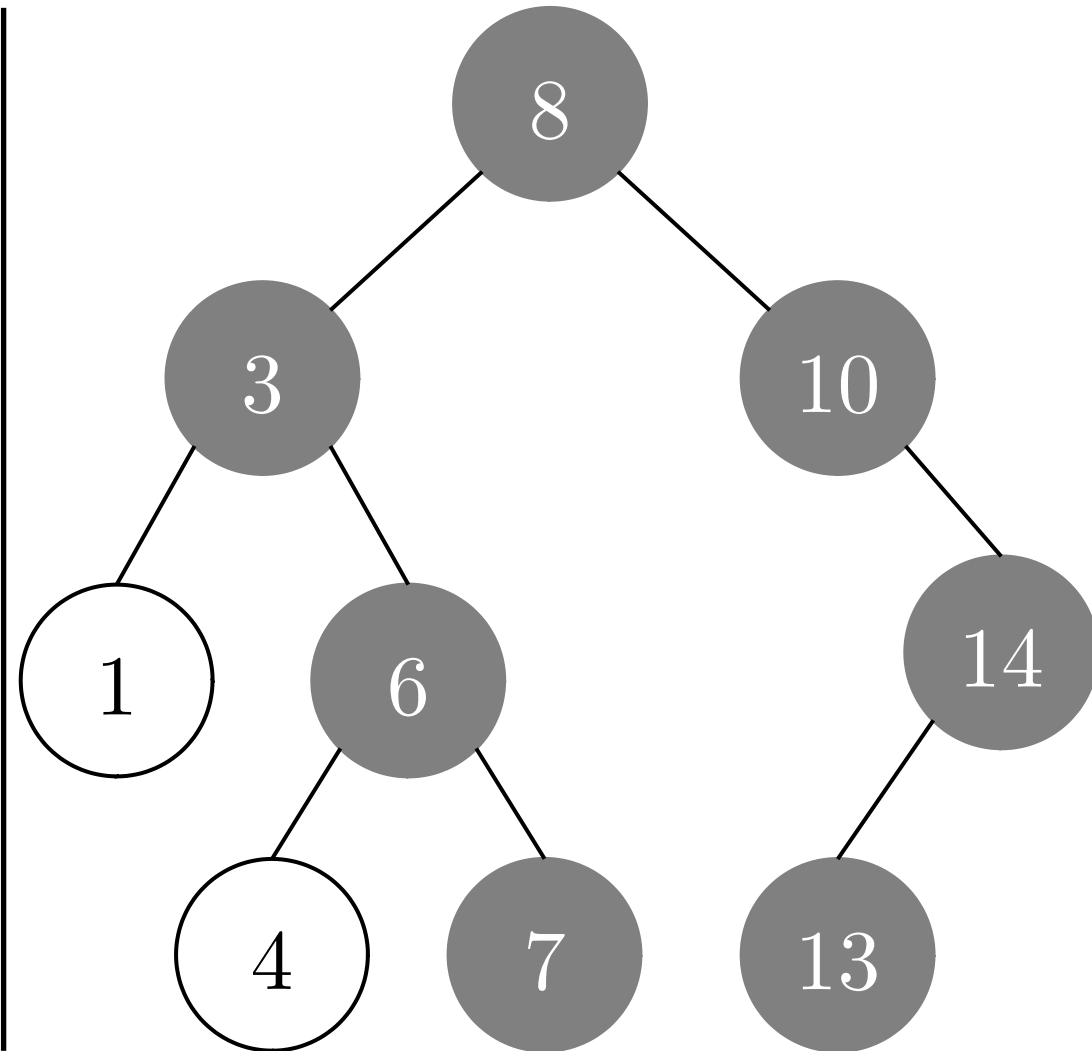
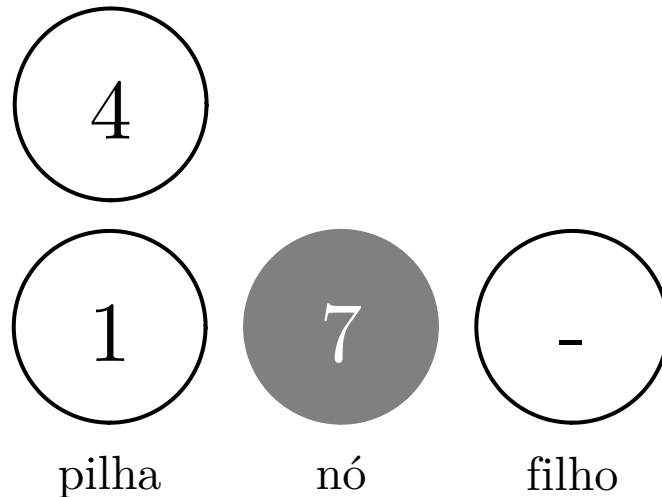
busca em profundidade

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def dfs(nó_inicial):  
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busca em profundidade

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busca em profundidade

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            if (not filho.visitado):  
                pilha.empilhar(filho)  
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```

4

1

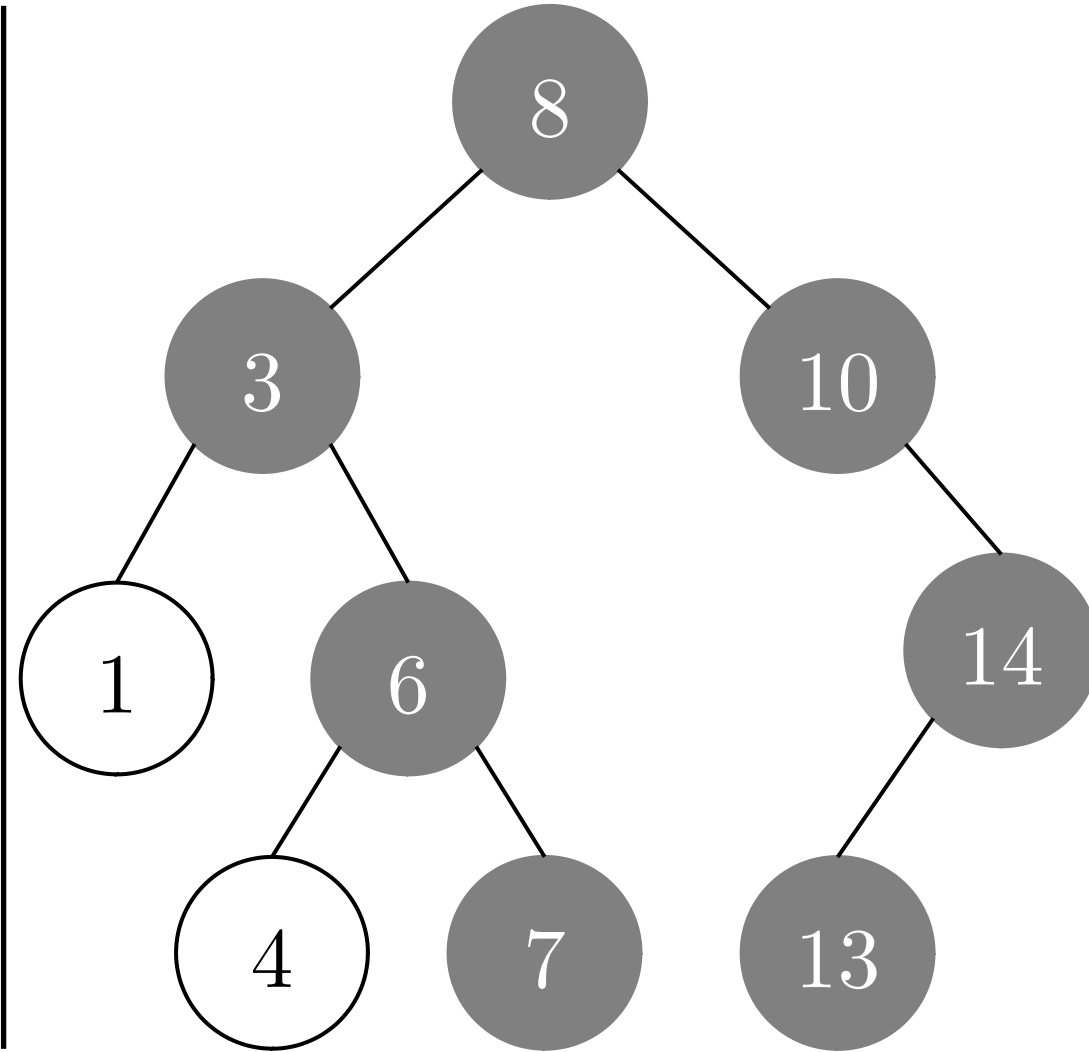
pilha

7

nó

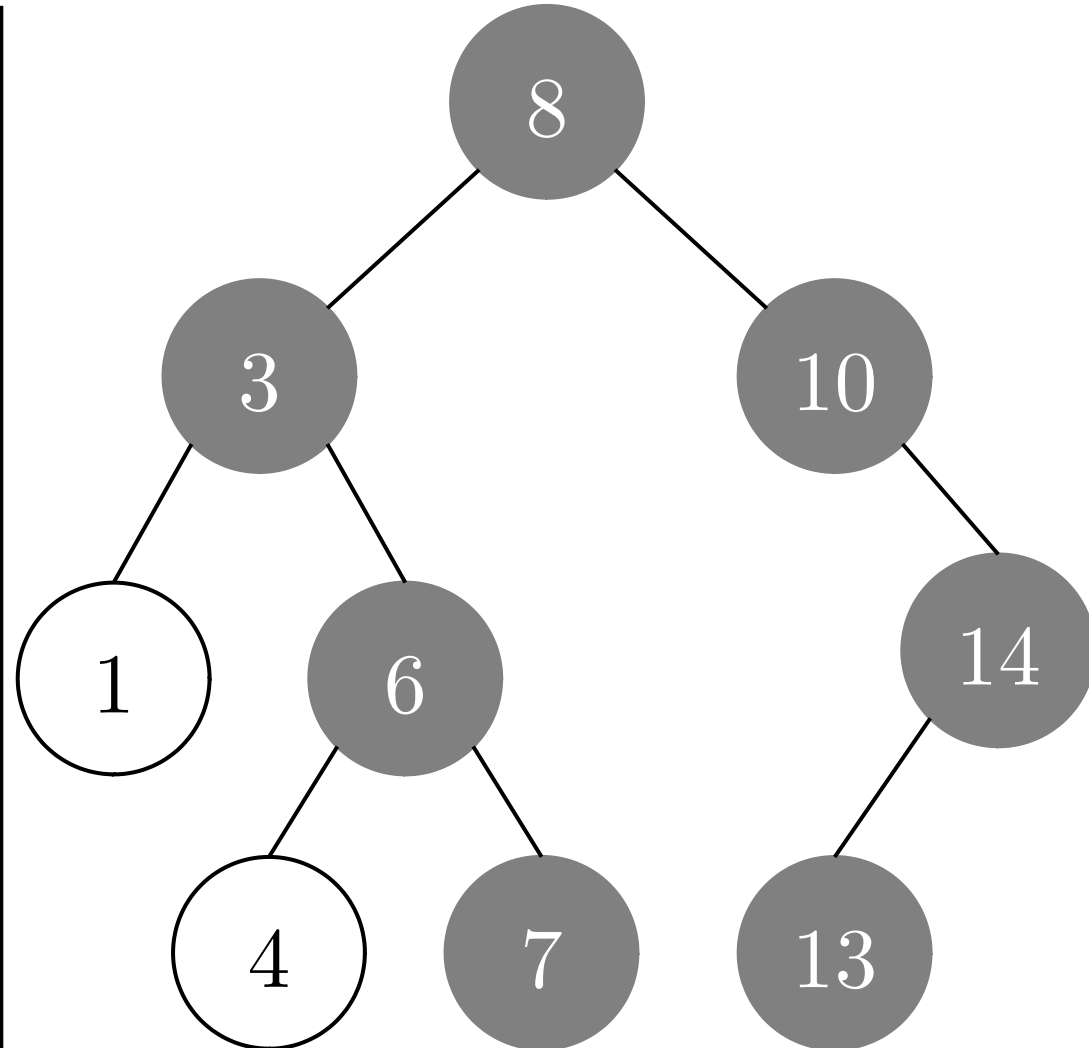
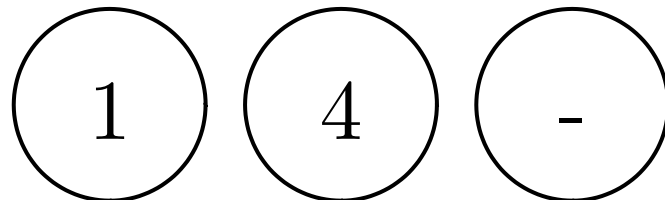
-

filho



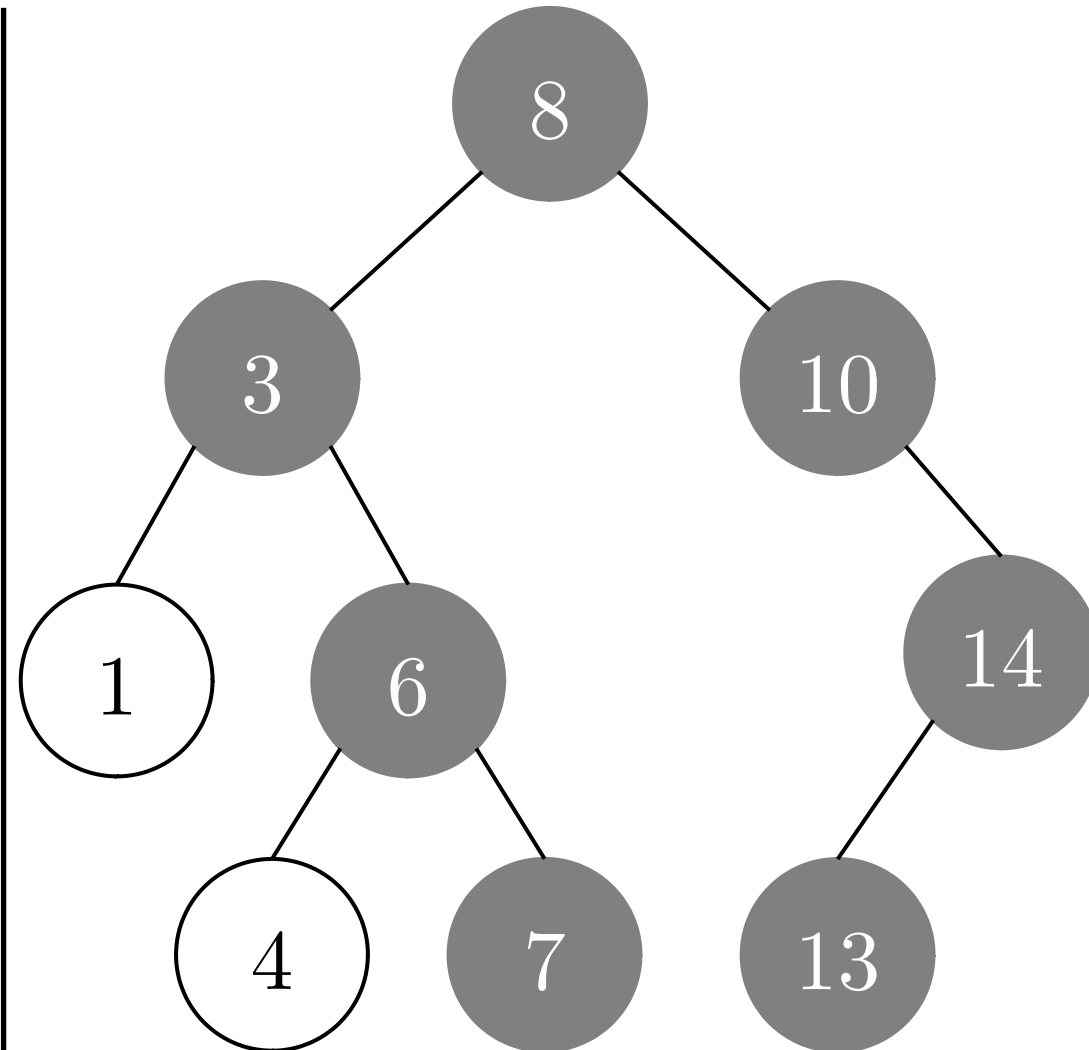
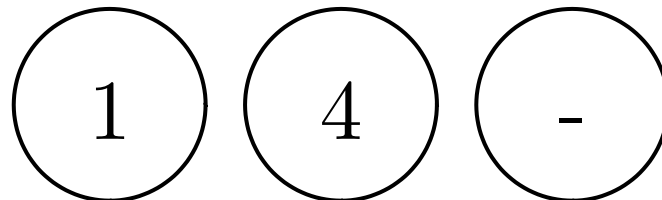
busca em profundidade

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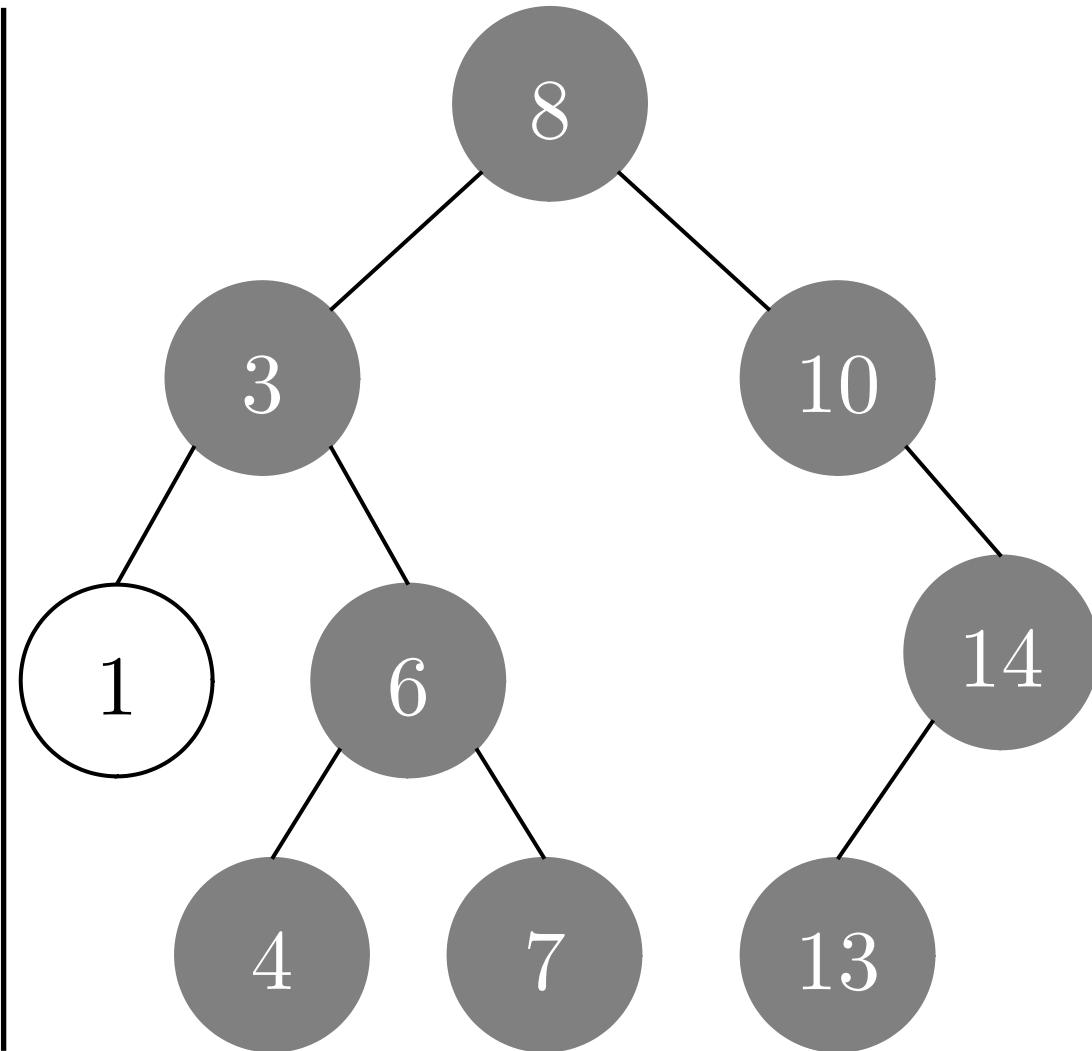
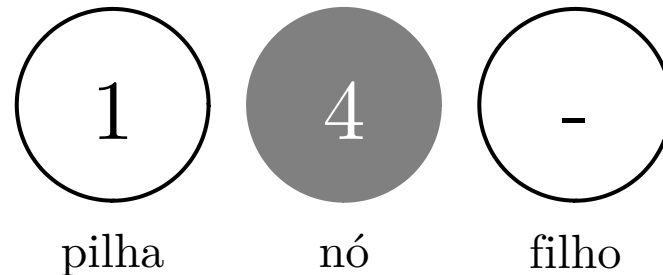
busca em profundidade

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def dfs(nó_inicial):  
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            if (not filho.visitado):  
                pilha.empilhar(filho)  
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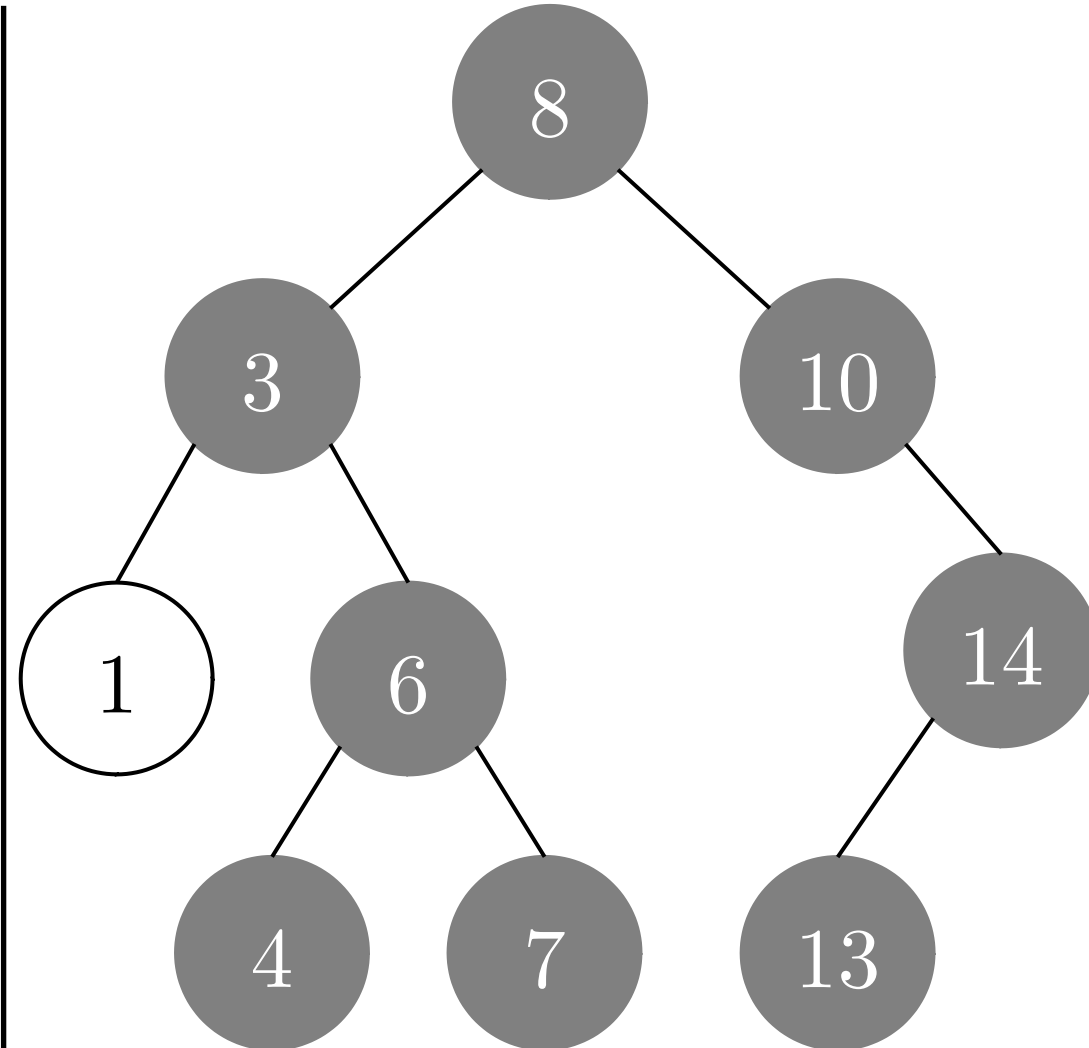
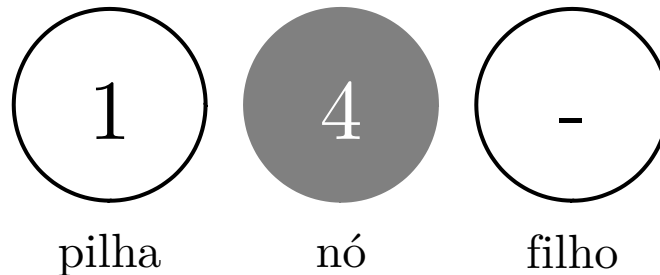
busca em profundidade

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def dfs(nó_inicial):  
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busca em profundidade

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                pilha.empilhar(filho)  
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```



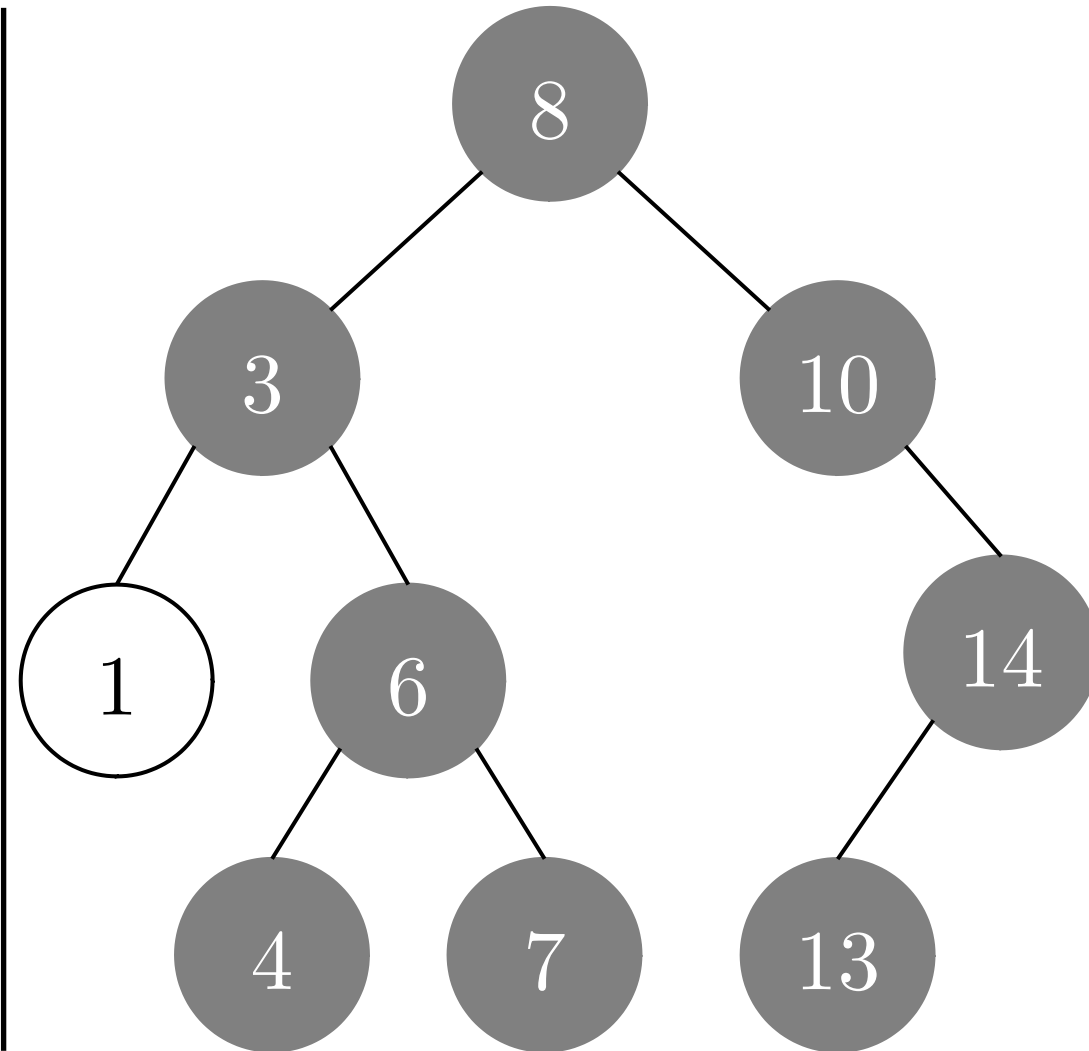
busca em profundidade

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                pilha.empilhar(filho)  
        nó.visitado = True
```

pilha

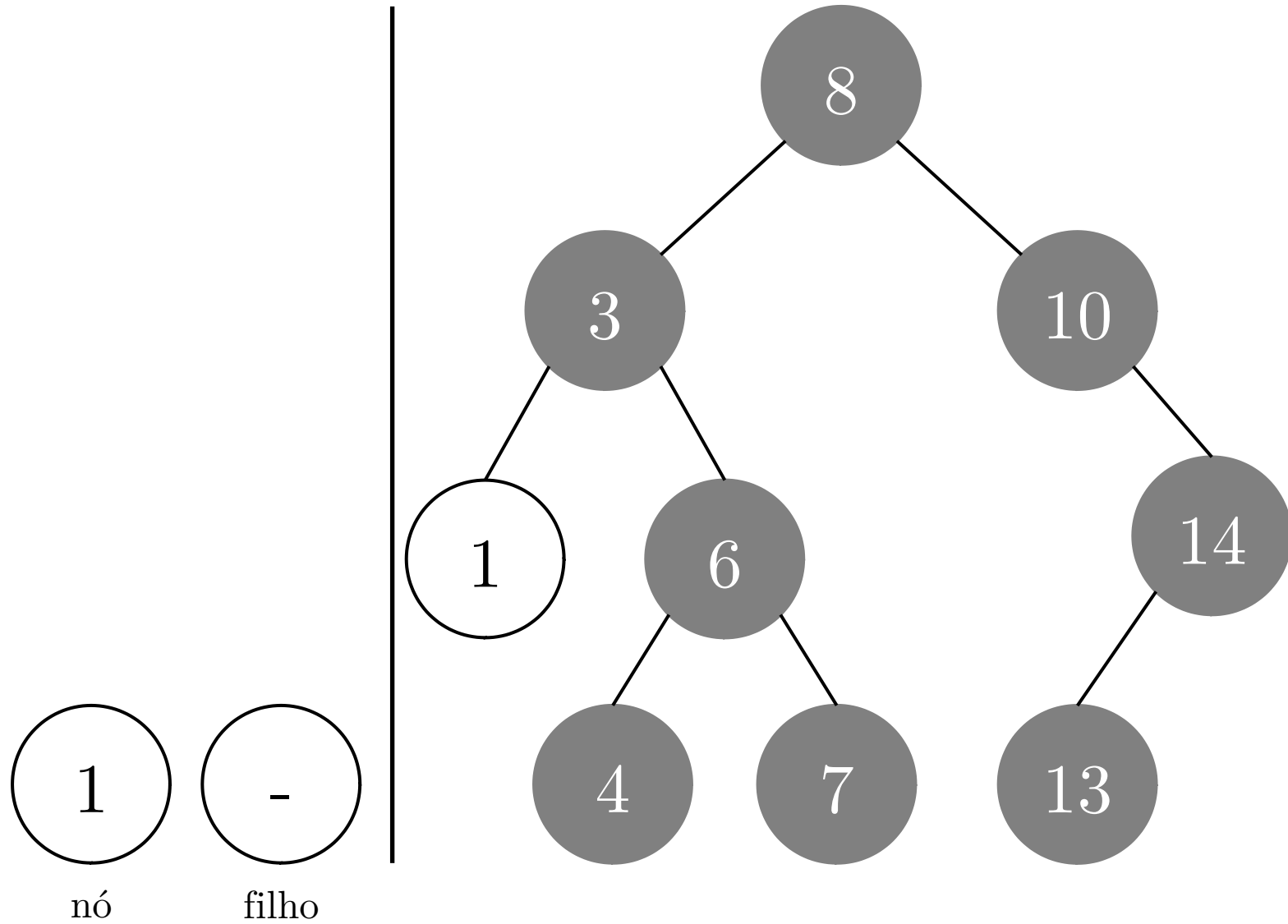
nó

filho



busca em profundidade

```
def dfs(nó_inicial):  
    pilha = Pilha()  
    pilha.empilhar(nó_inicial)  
    while (not pilha.eh_vazia()):  
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```



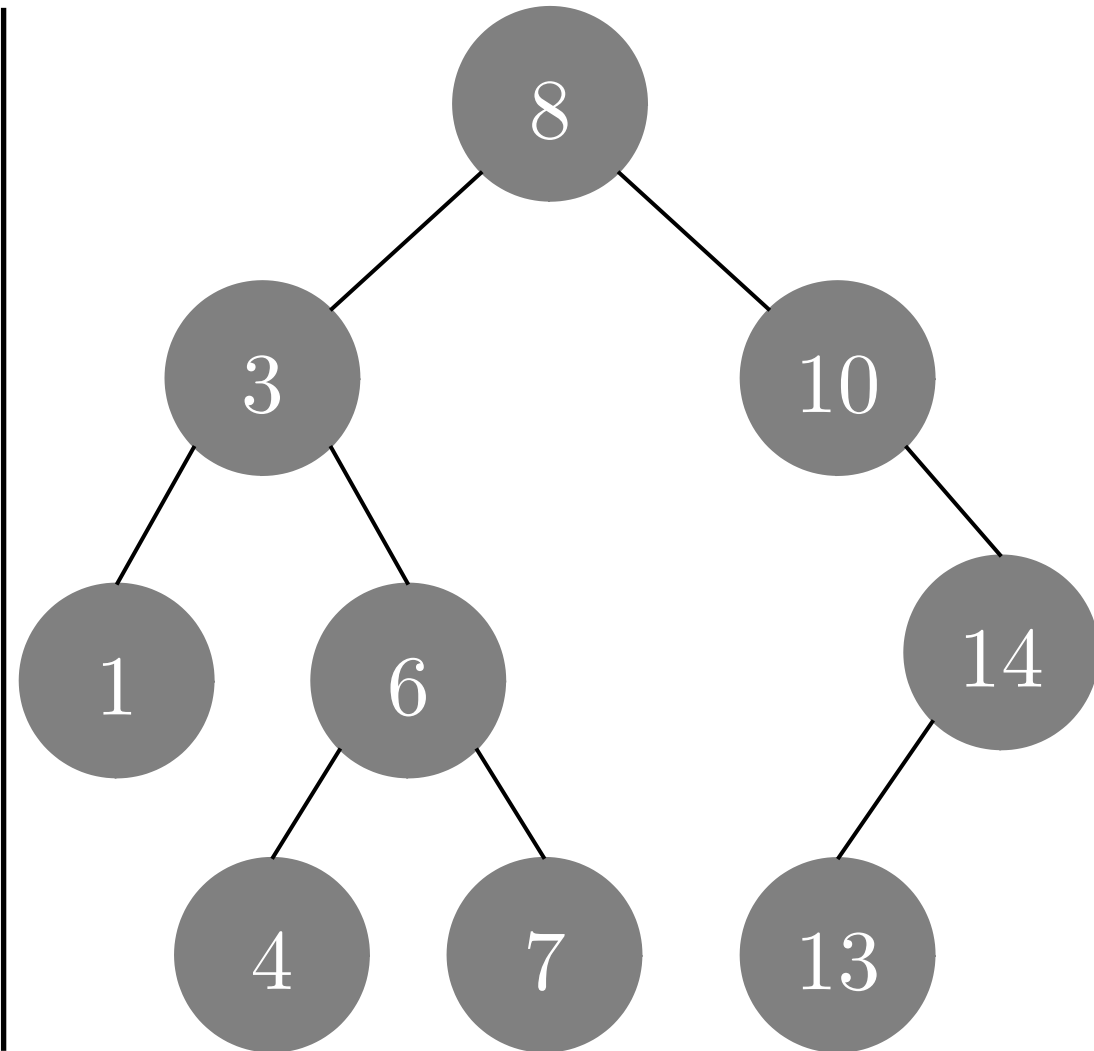
busca em profundidade

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    pilha.empilhar(nó_inicial)  
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        for filho in nó.filhos():  
            if (not filho.visitado):  
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        nó.visitado = True
```

pilha

nó

filho



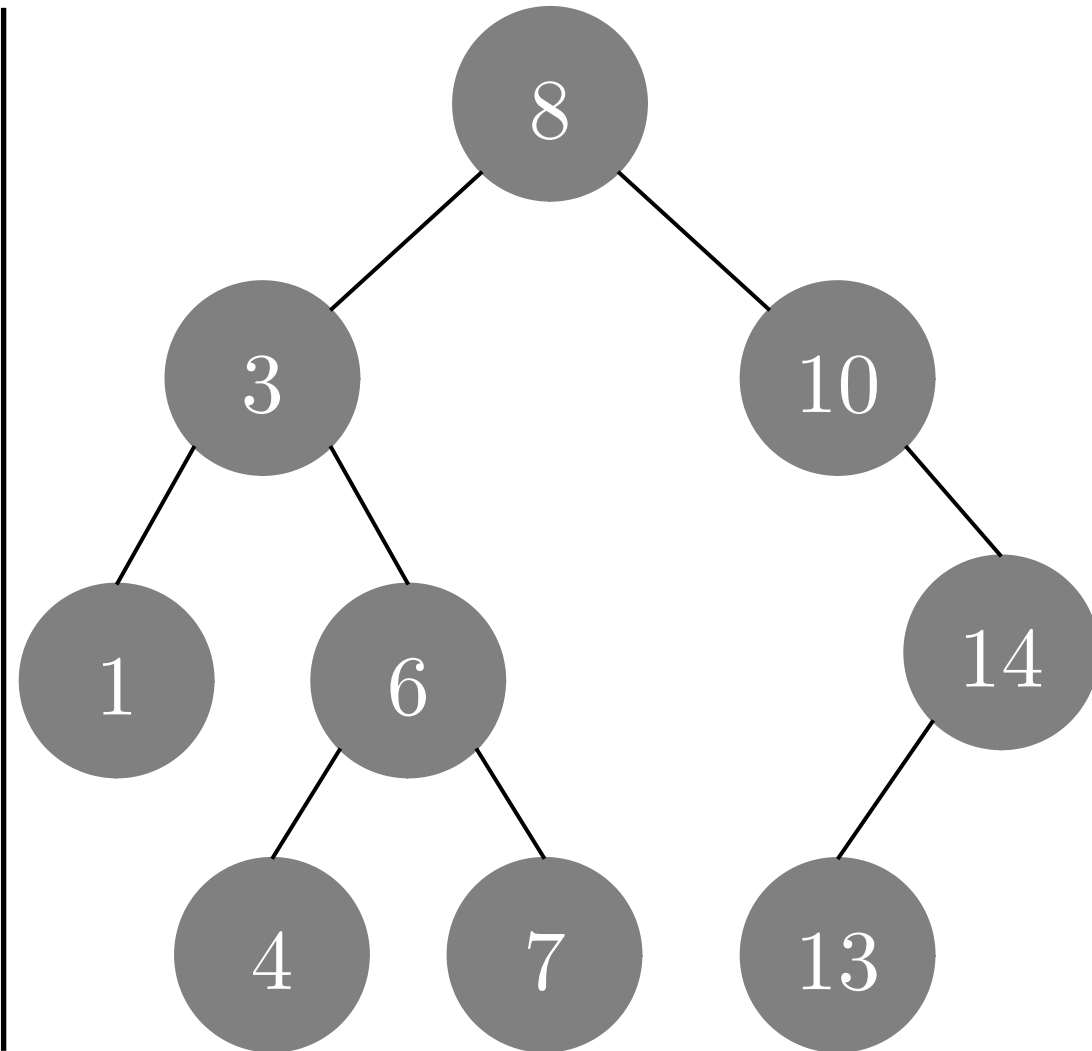
busca em profundidade

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    pilha = Pilha()  
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            if (not filho.visitado):  
                pilha.empilhar(filho)  
        nó.visitado = True
```

pilha

nó

filho



busca em profundidade

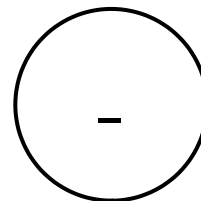
```
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        nó = pilha.desempilhar()  
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            if (not filho.visitado):  
                pilha.empilhar(filho)  
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```



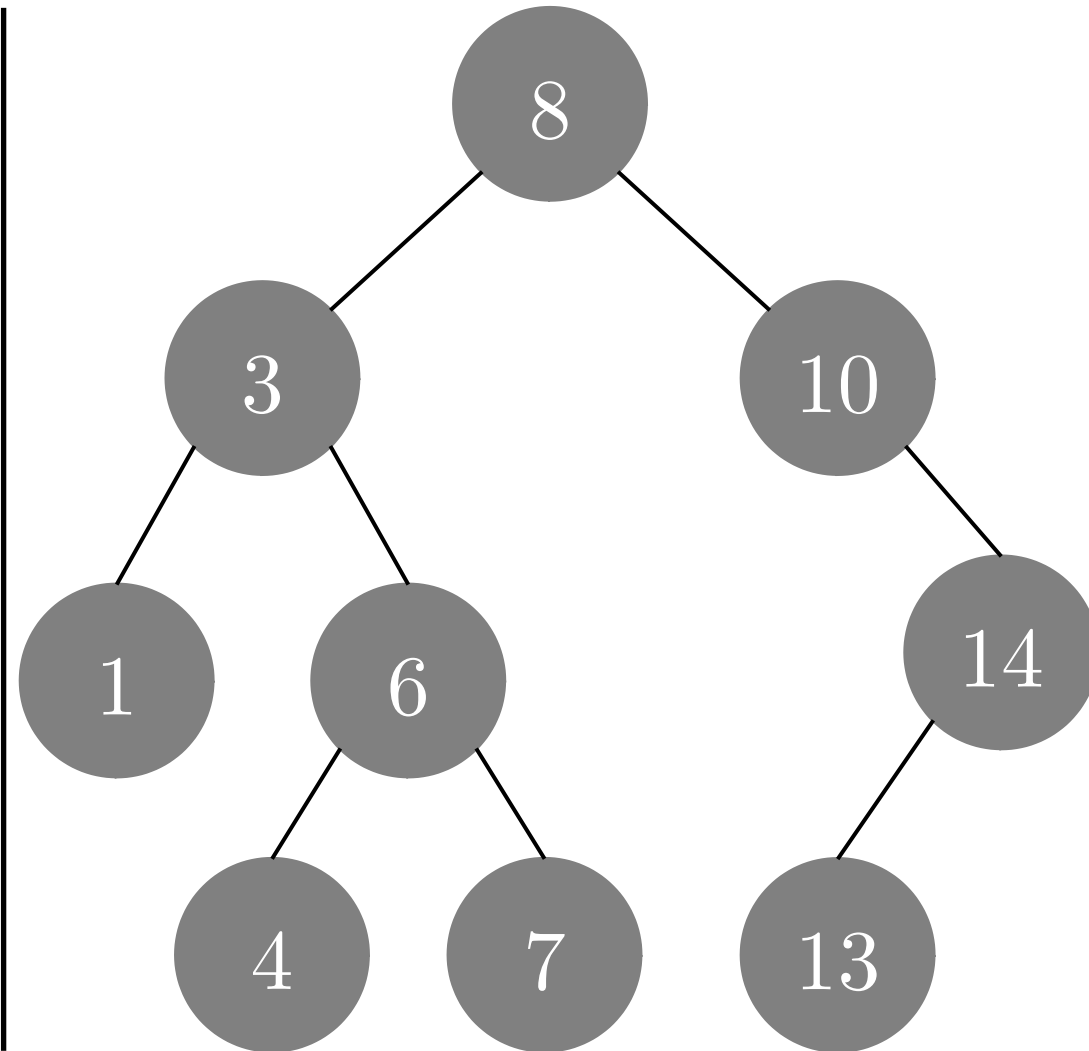
pilha



nó



filho



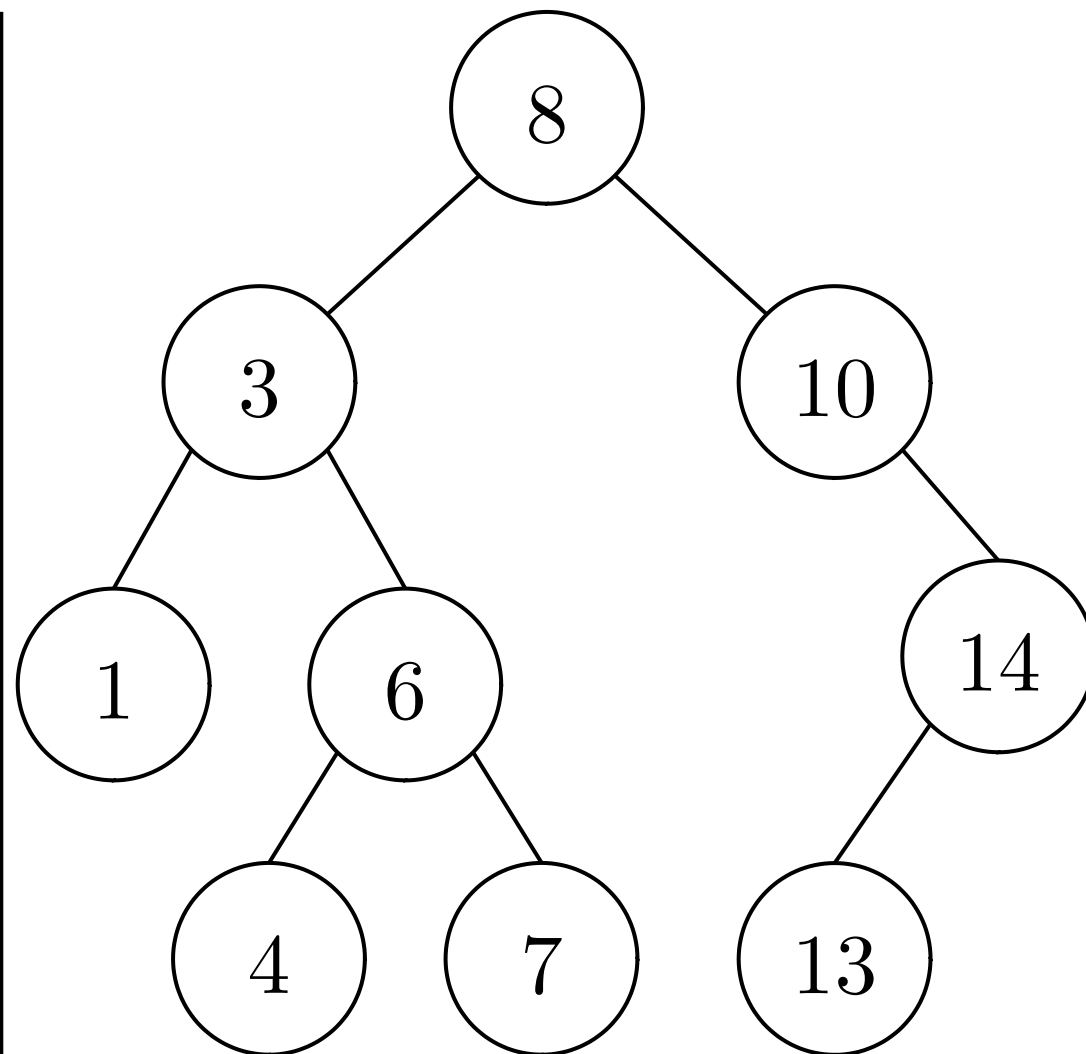
busca em profundidade

recursivo

busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

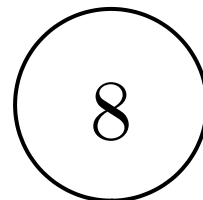


busca em profundidade

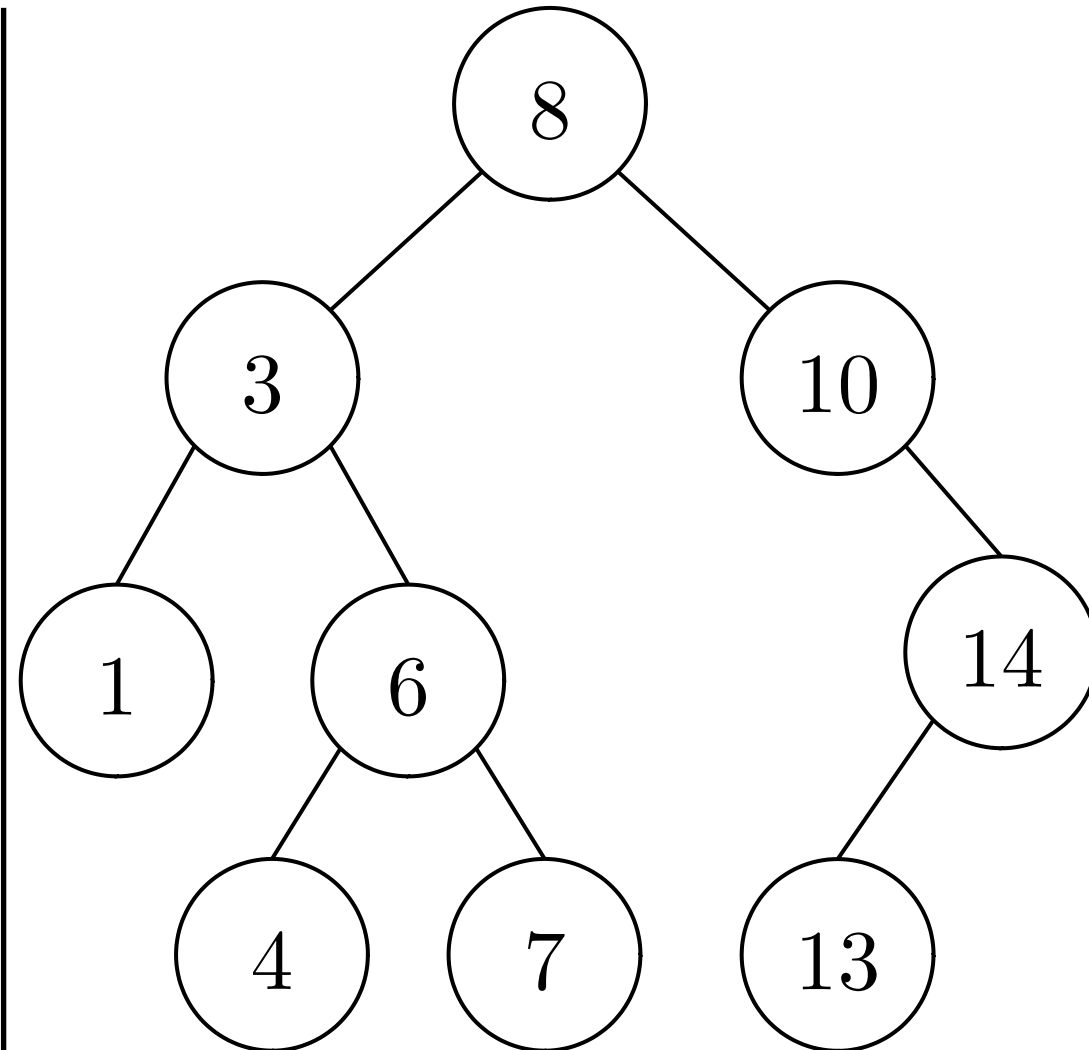
RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

dfsR()



nó



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

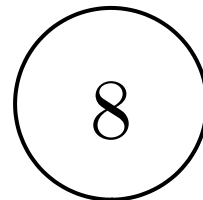
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

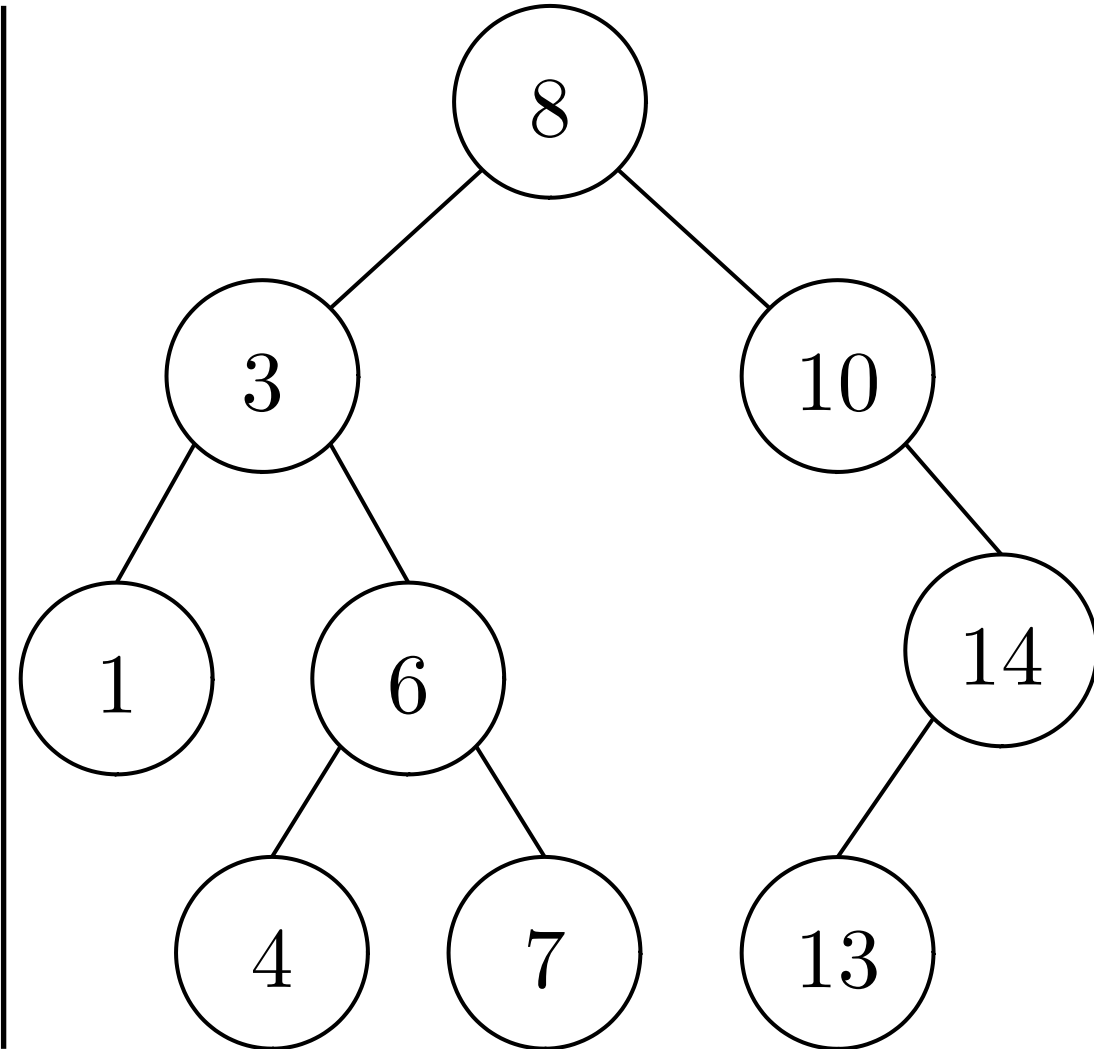
```
            dfsR(filho)
```

```
    nó.visitado = True
```

dfsR()



nó



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

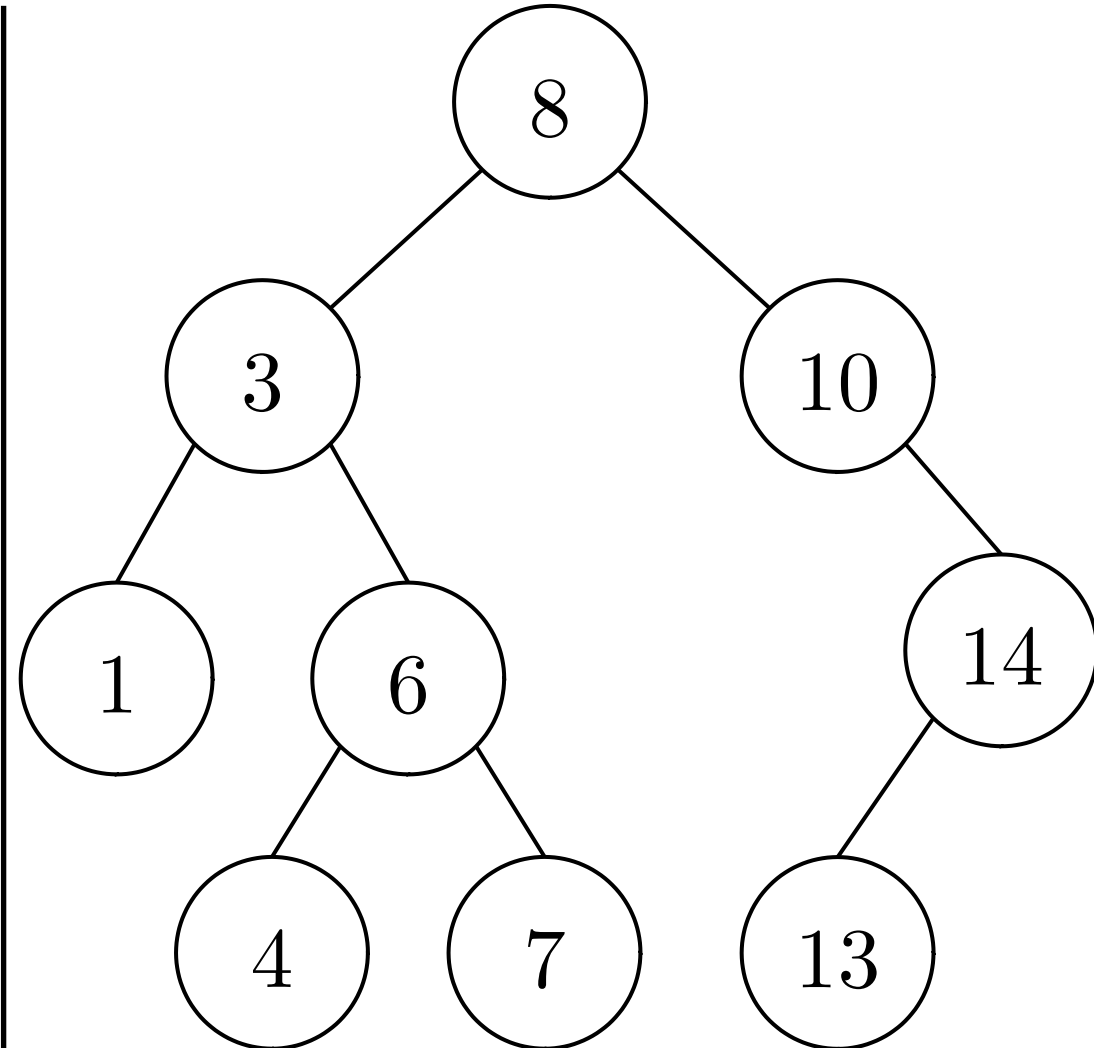
dfsR()

8

nó

3

filho

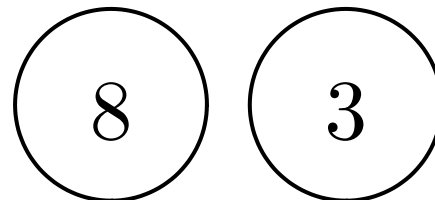


busca em profundidade

RECURSIVO

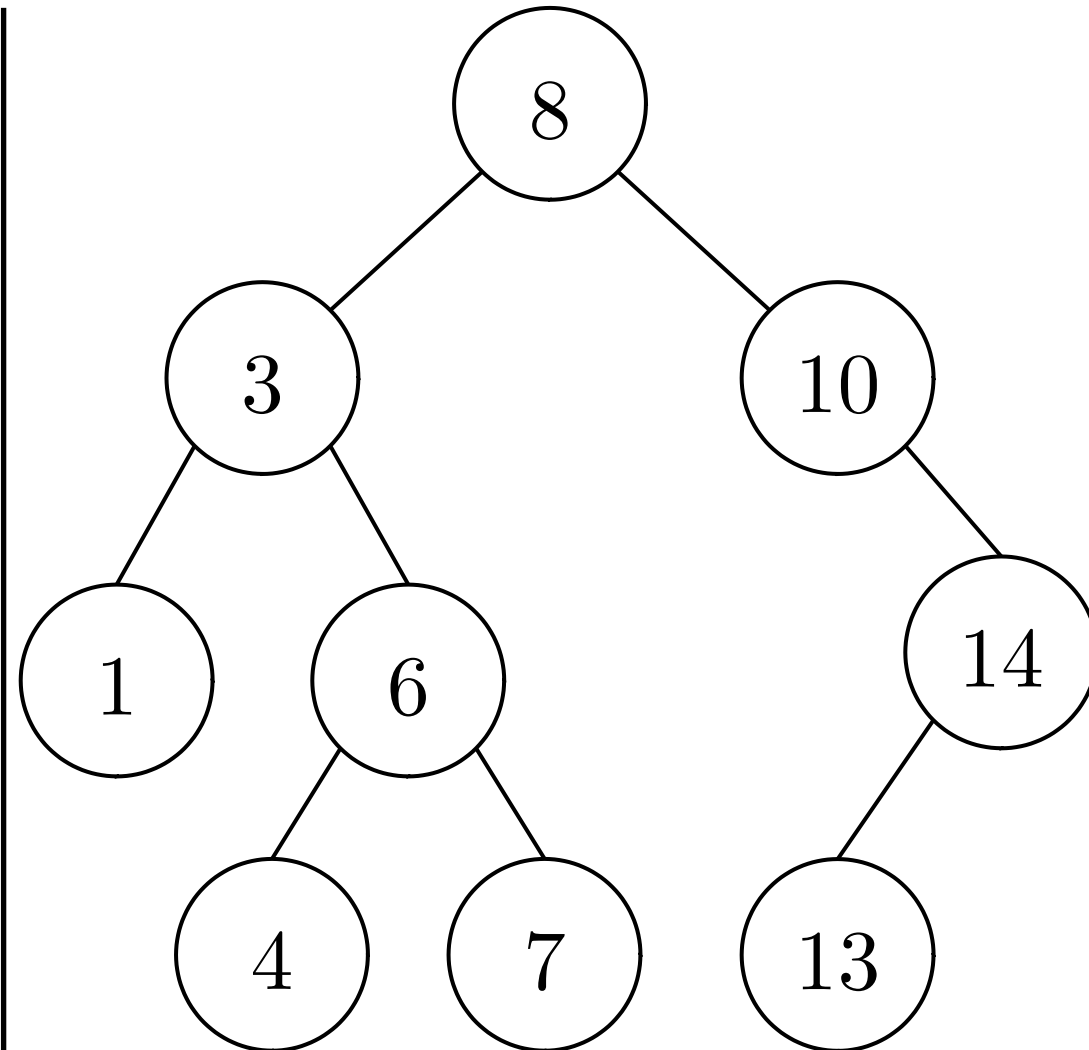
```
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    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

dfsR()



nó

filho



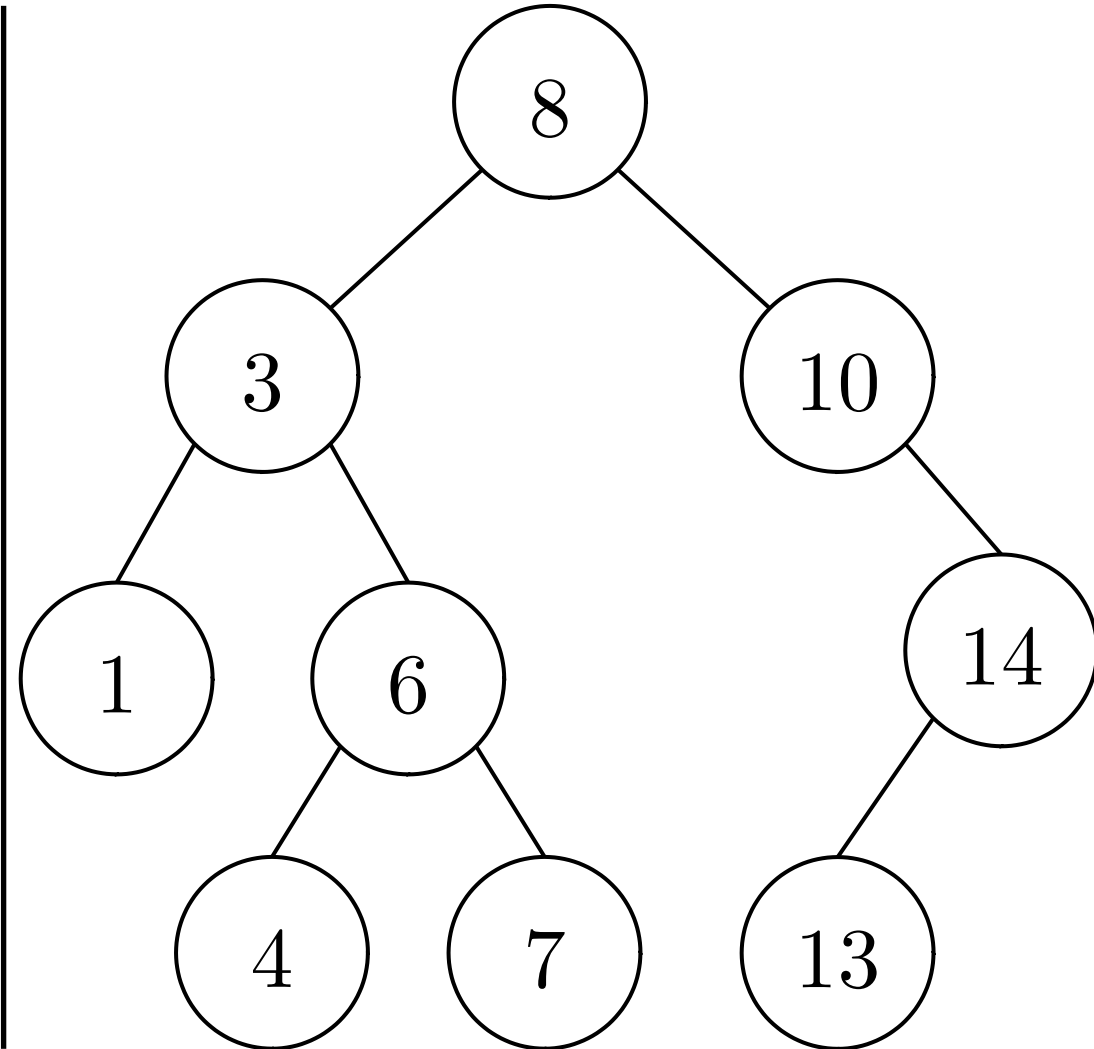
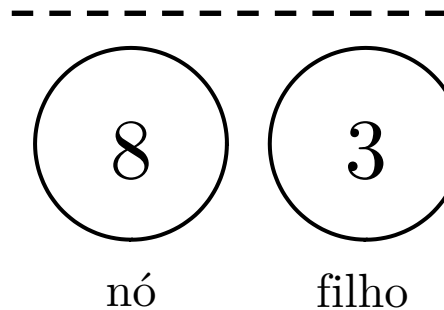
busca em profundidade

RECURSIVO

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```

dfsR()'

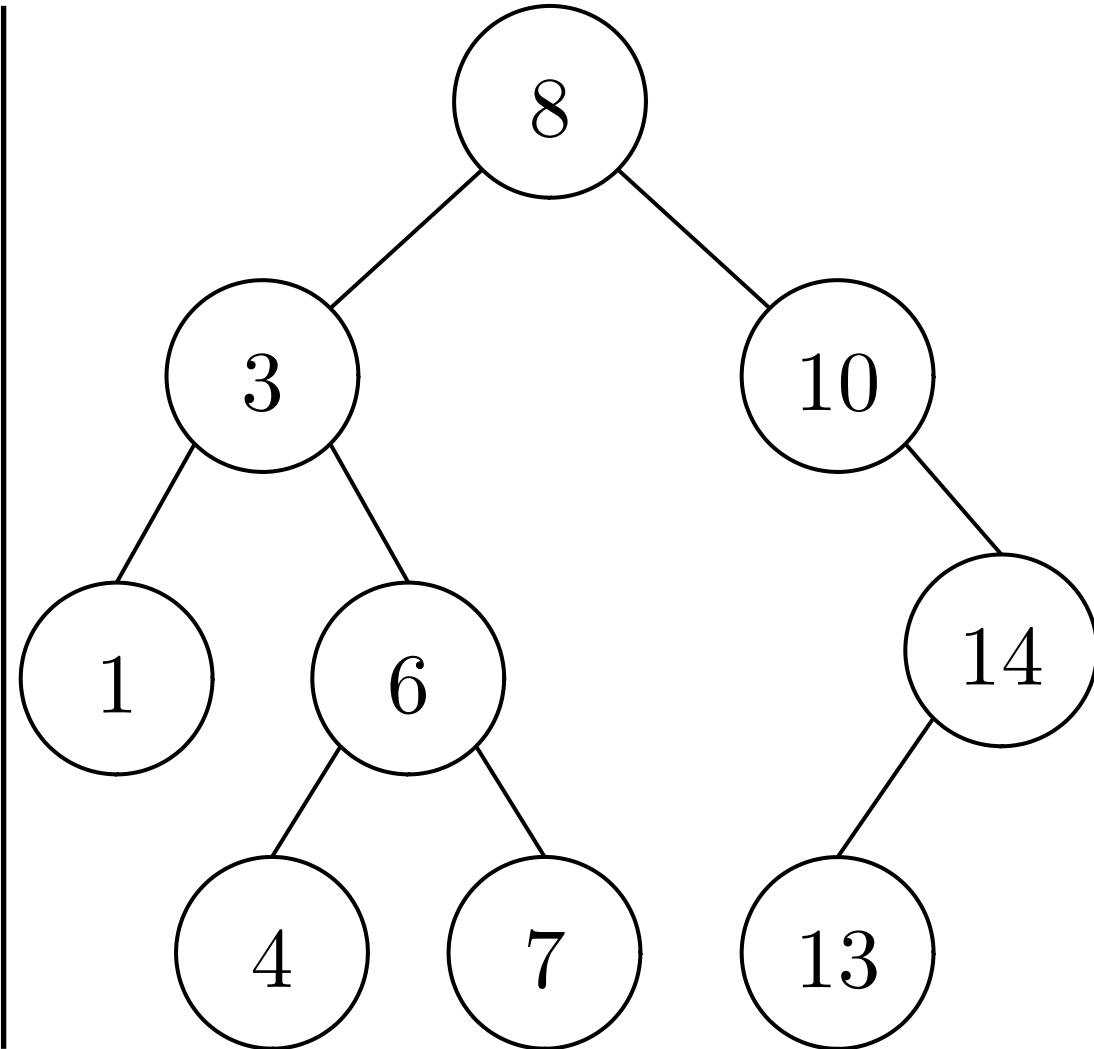
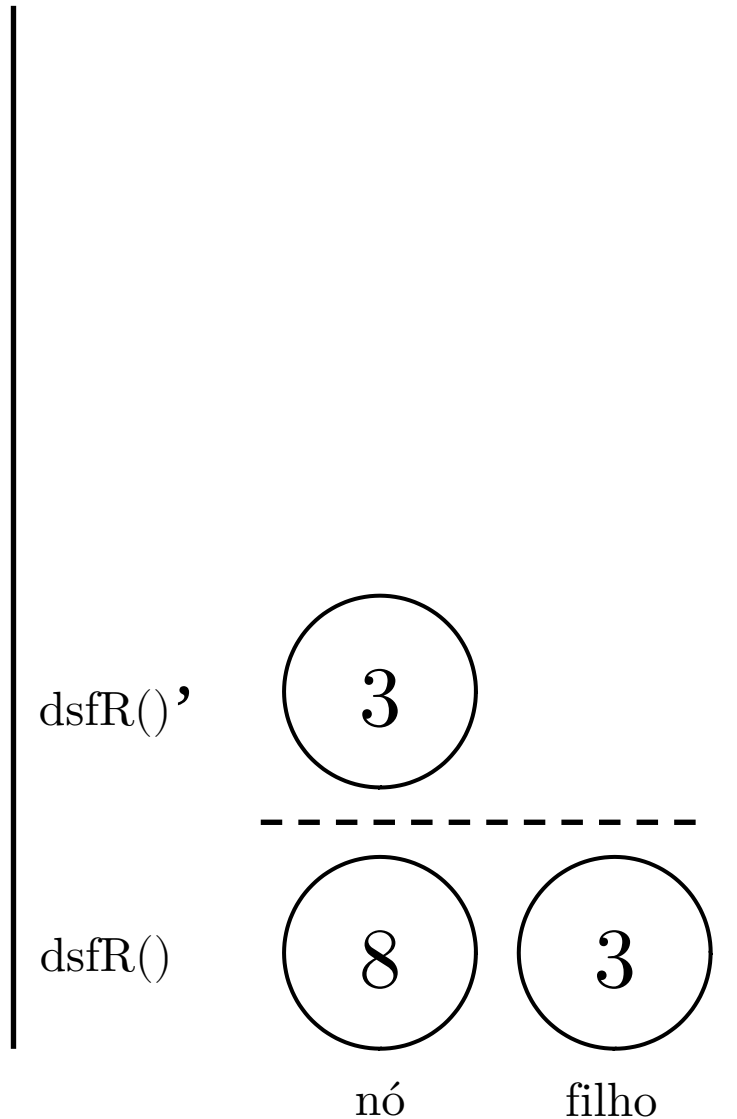
dfsR()



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

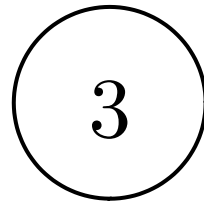
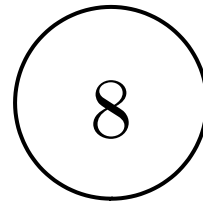
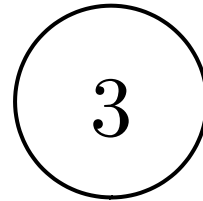
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

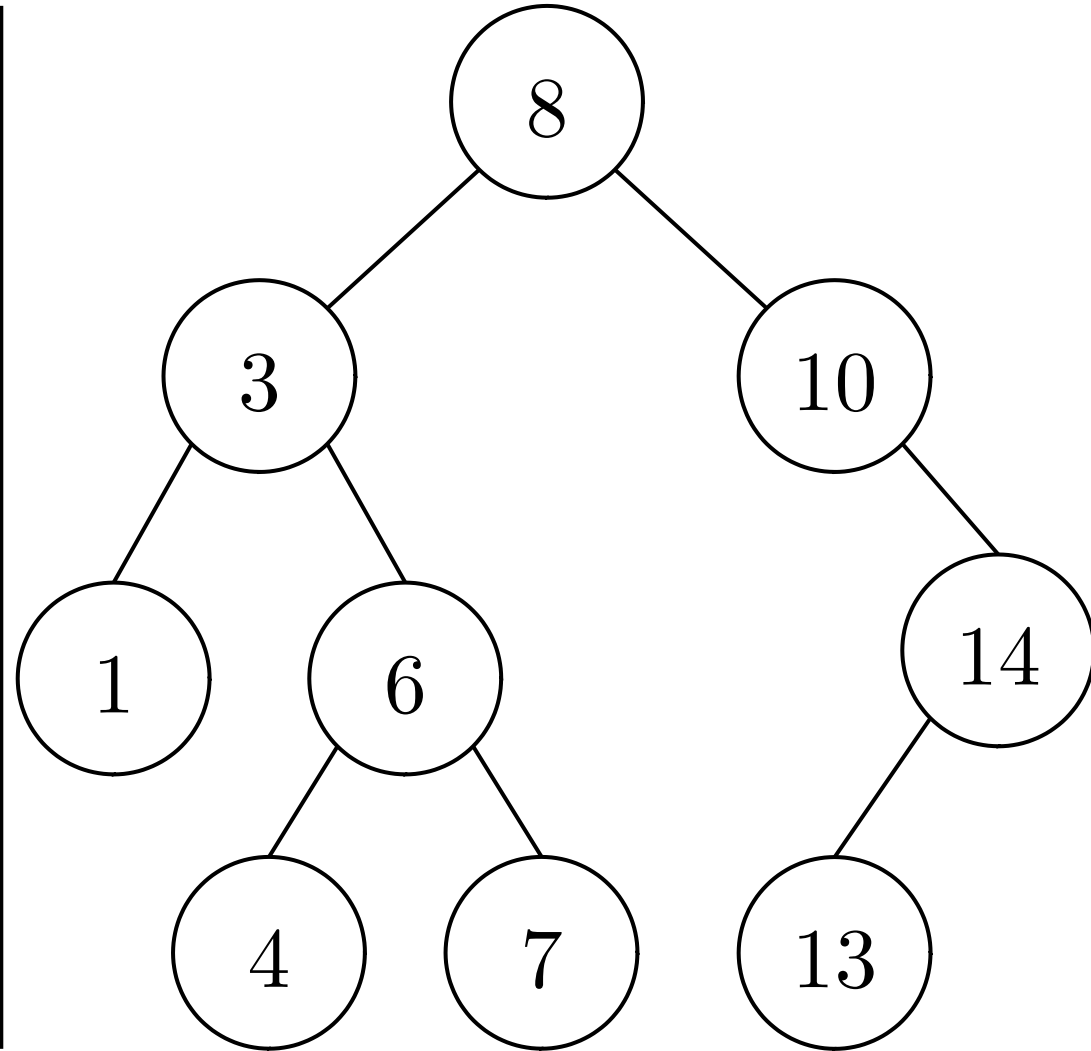
dfsR()'

dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
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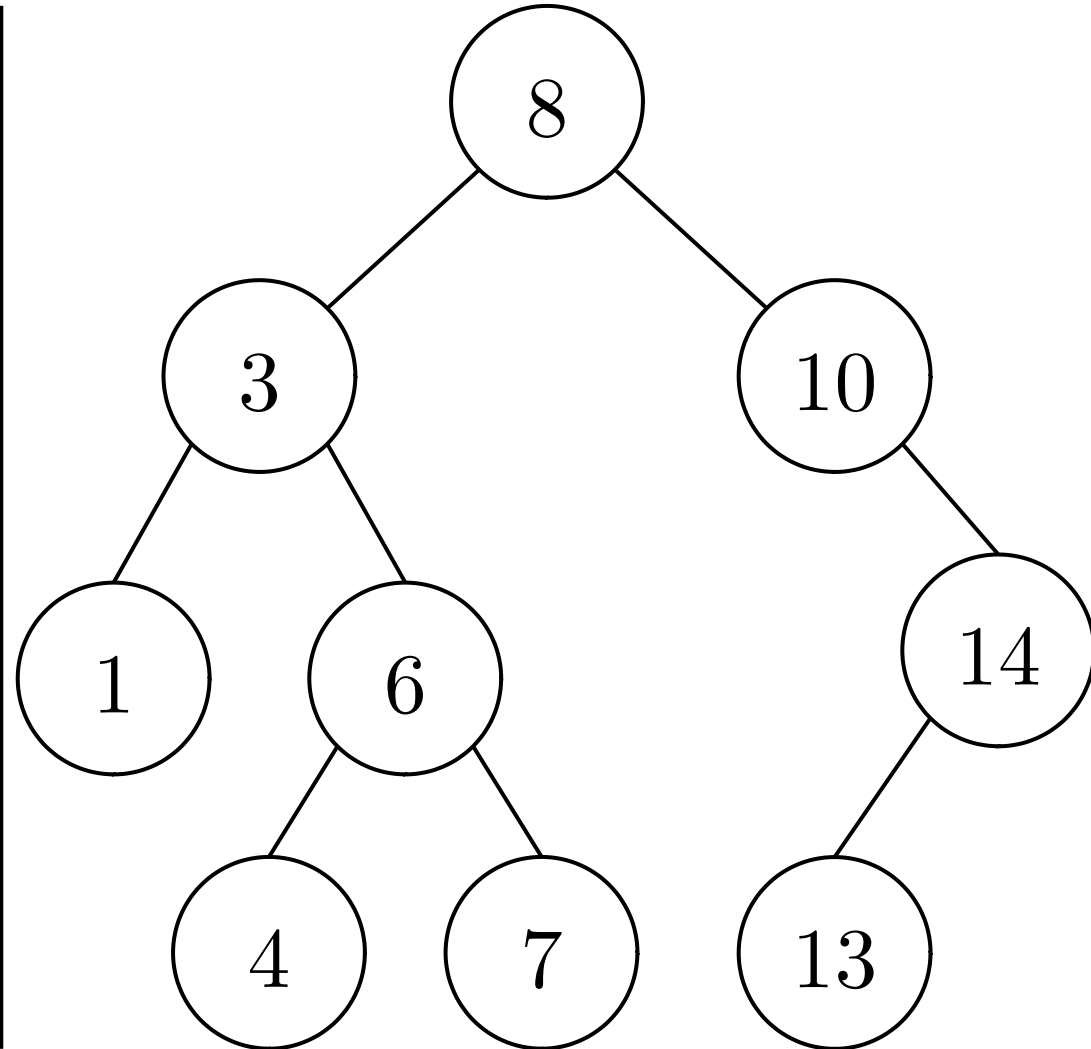
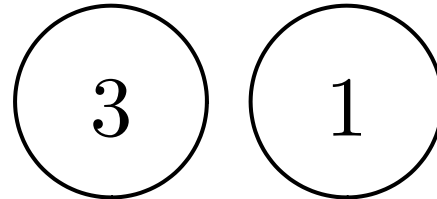
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

dfsR()'

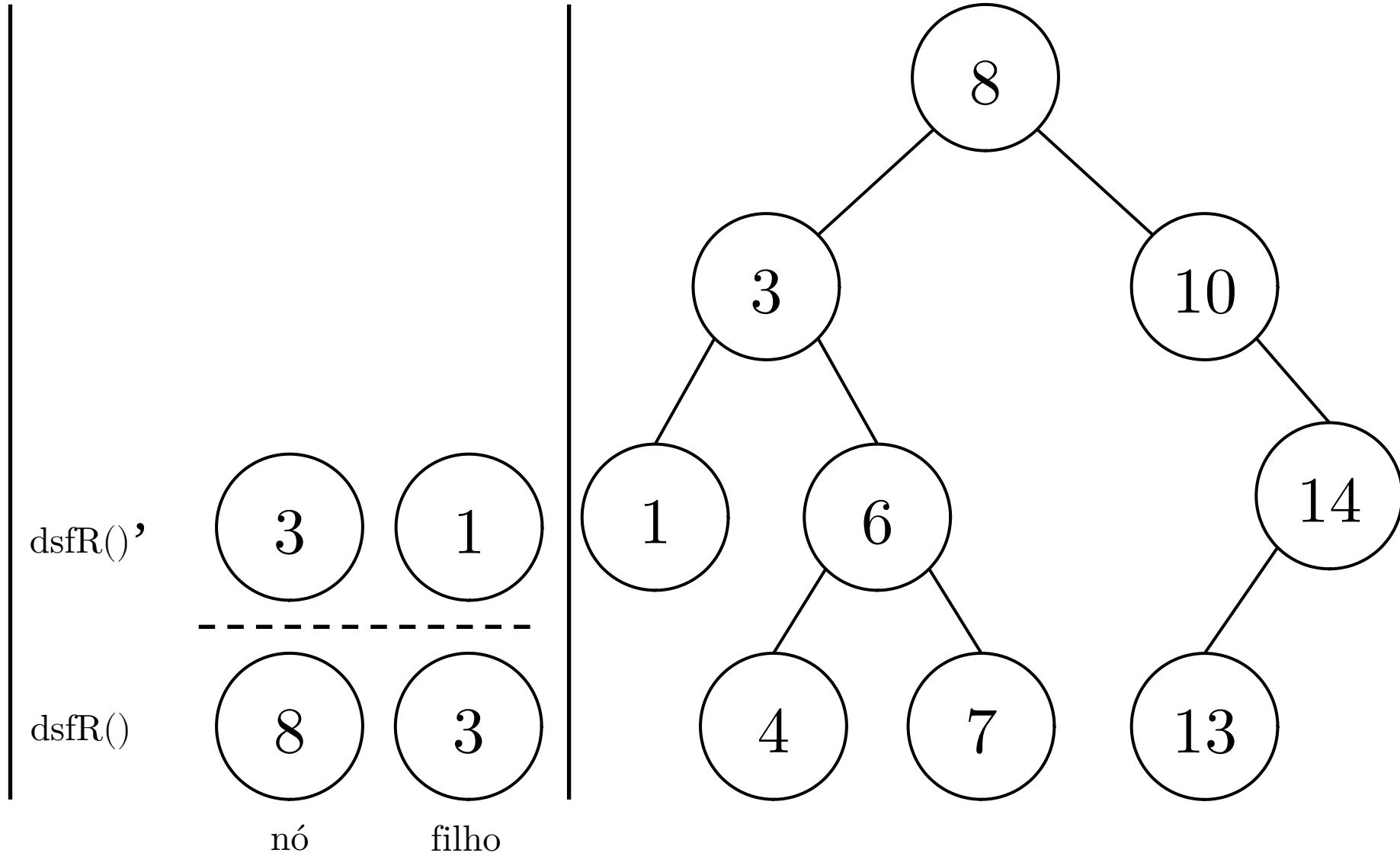
dfsR()



busca em profundidade

RECURSIVO

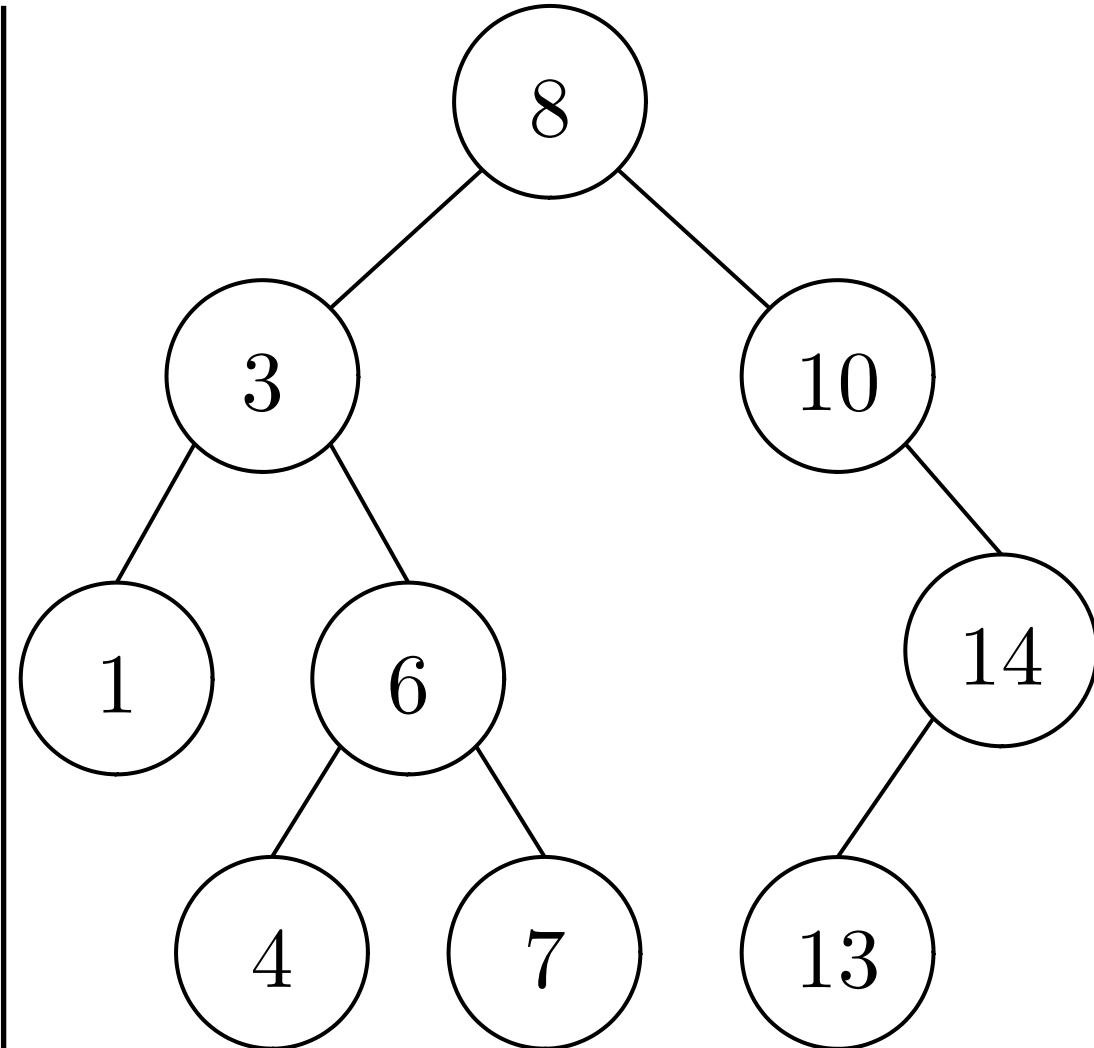
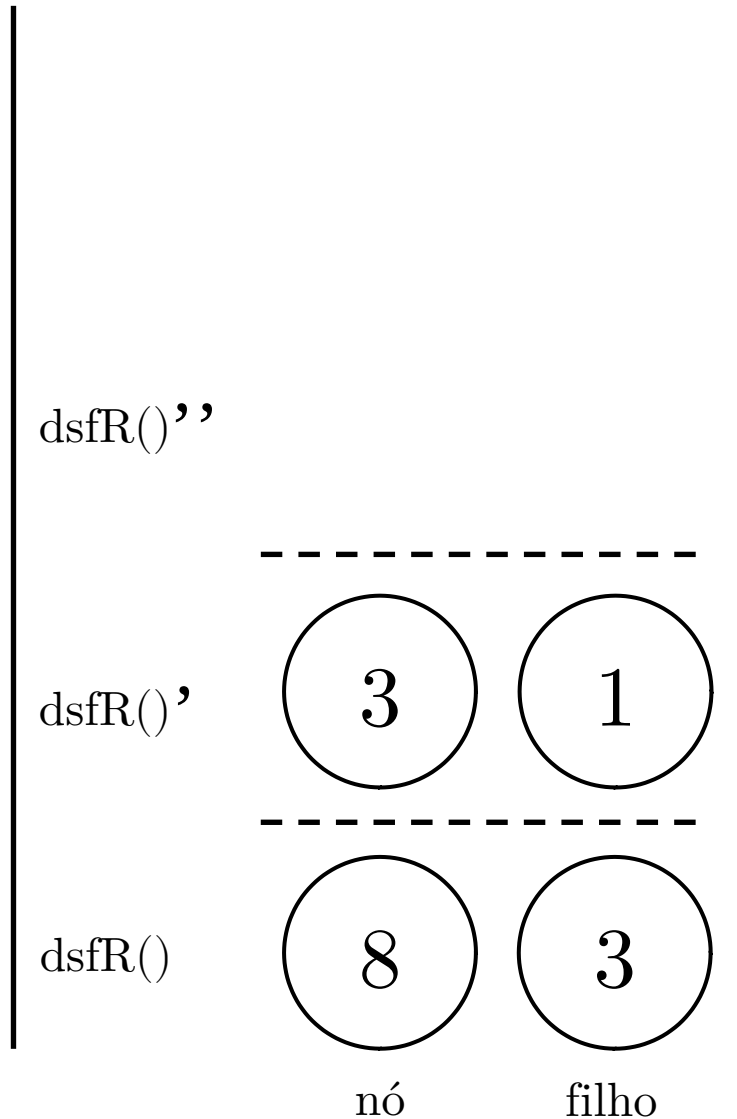
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busca em profundidade

RECURSIVO

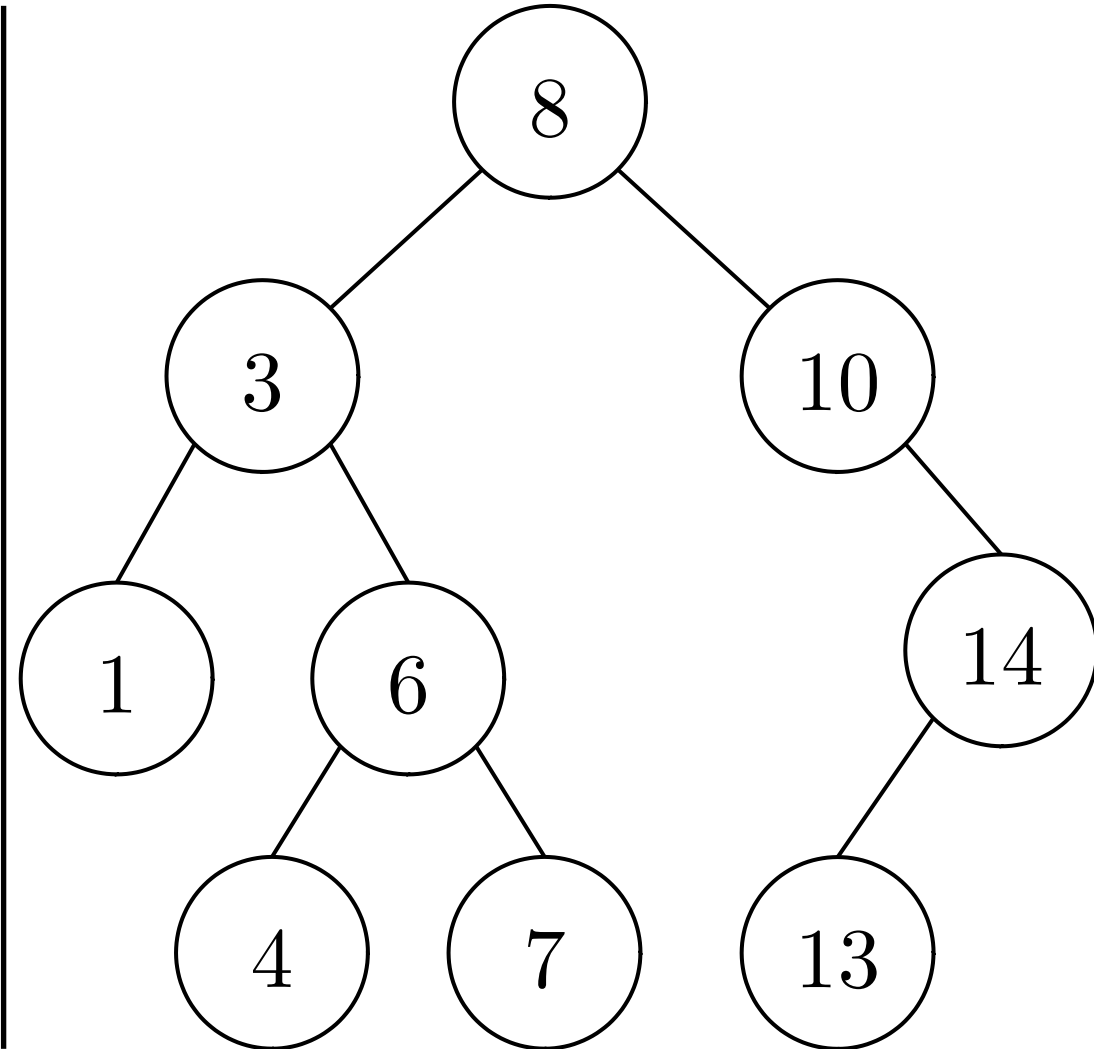
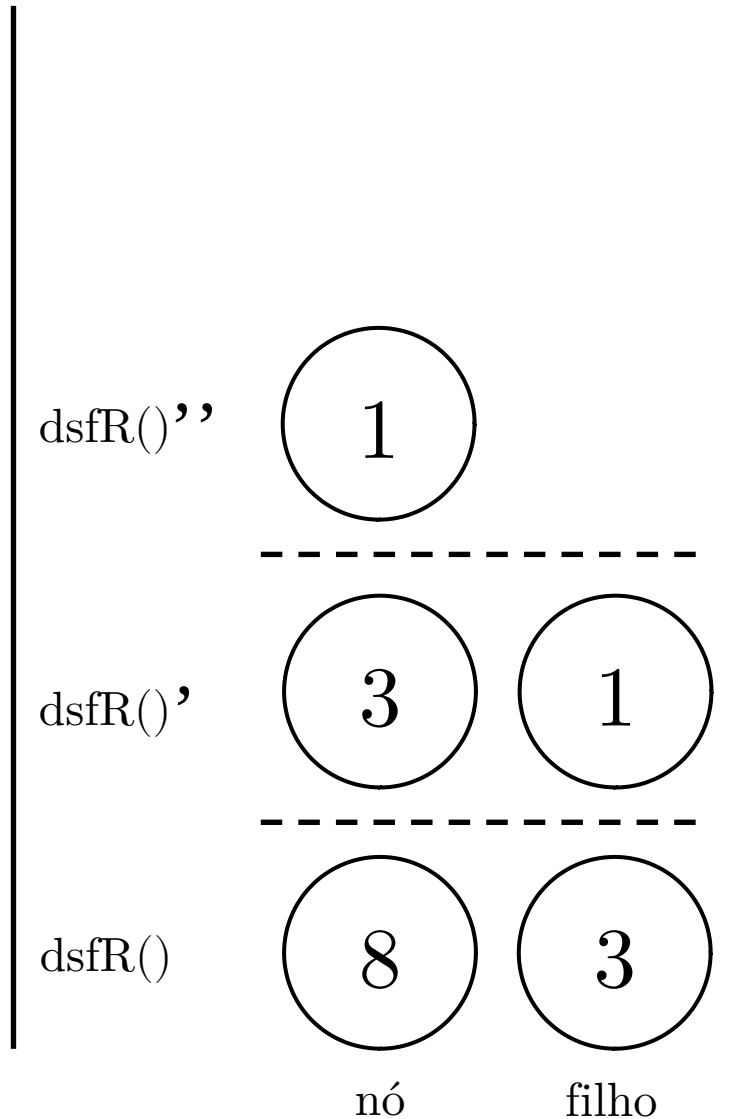
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busca em profundidade

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busca em profundidade

RECURSIVO

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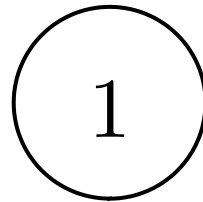
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

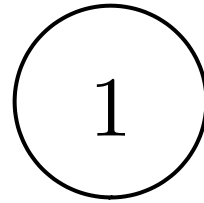
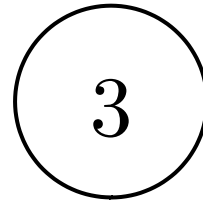
```
            dfsR(filho)
```

```
    nó.visitado = True
```

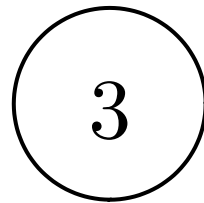
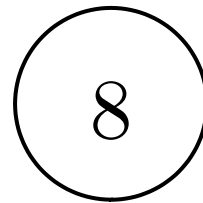
dfsR()''



dfsR()'

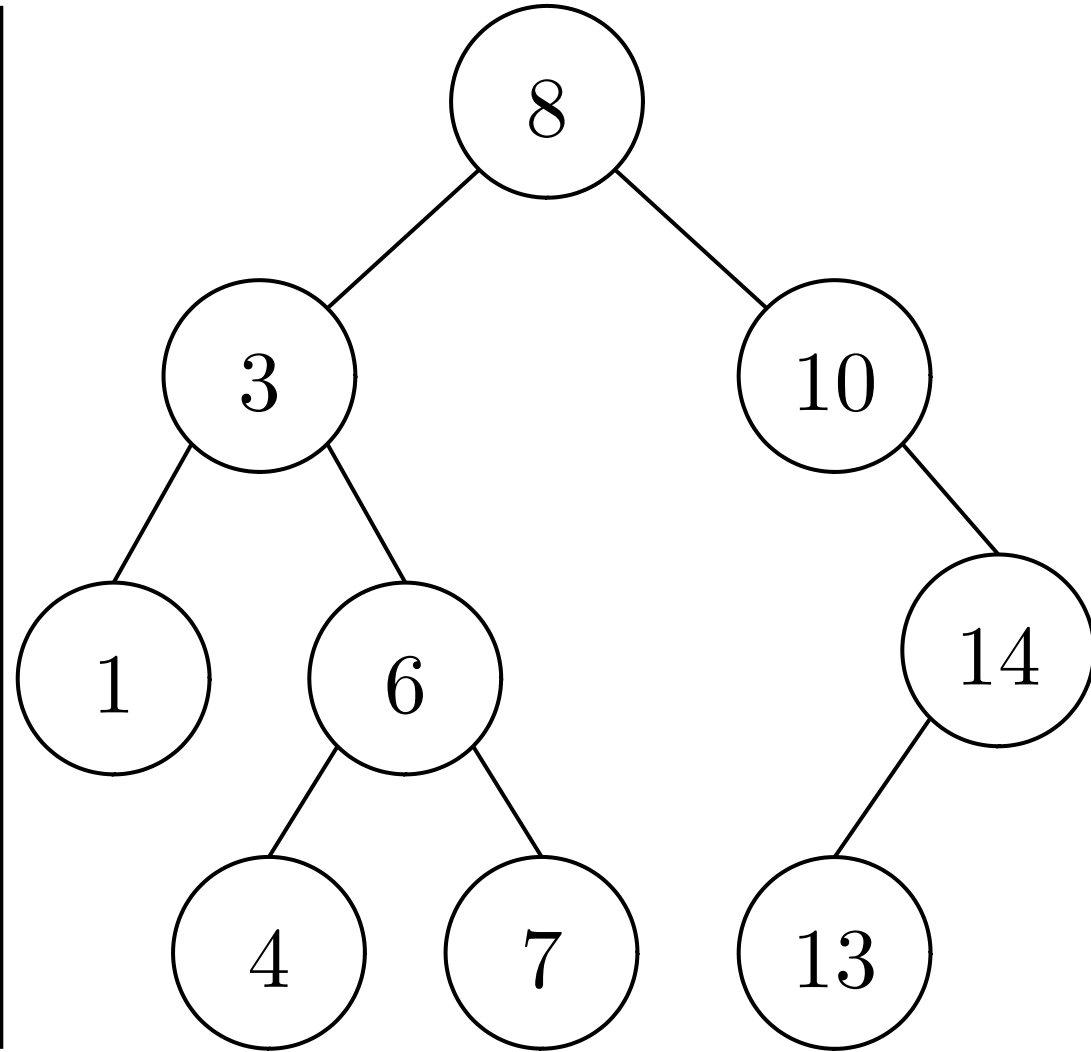


dfsR()



nó

filho



busca em profundidade

RECURSIVO

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        return
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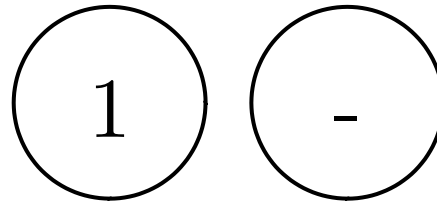
```
    for filho in nó.filhos():
```

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        if (not filho.visitado):
```

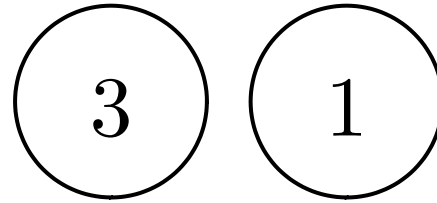
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            dfsR(filho)
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```
    nó.visitado = True
```

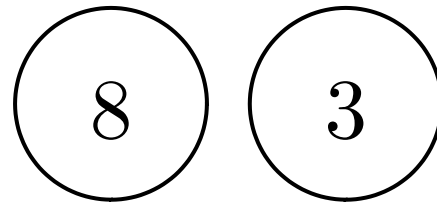
dfsR()''



dfsR()'

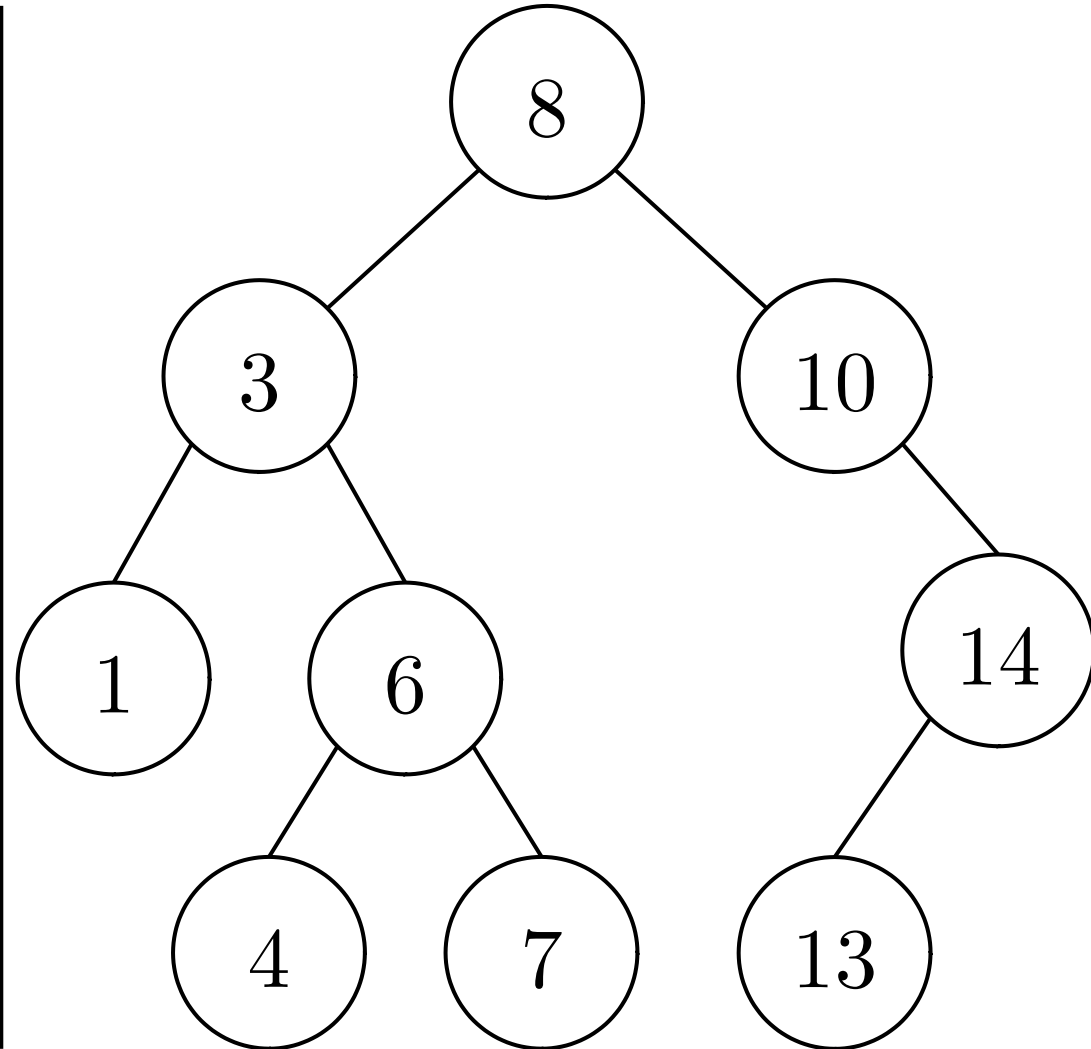


dfsR()



nó

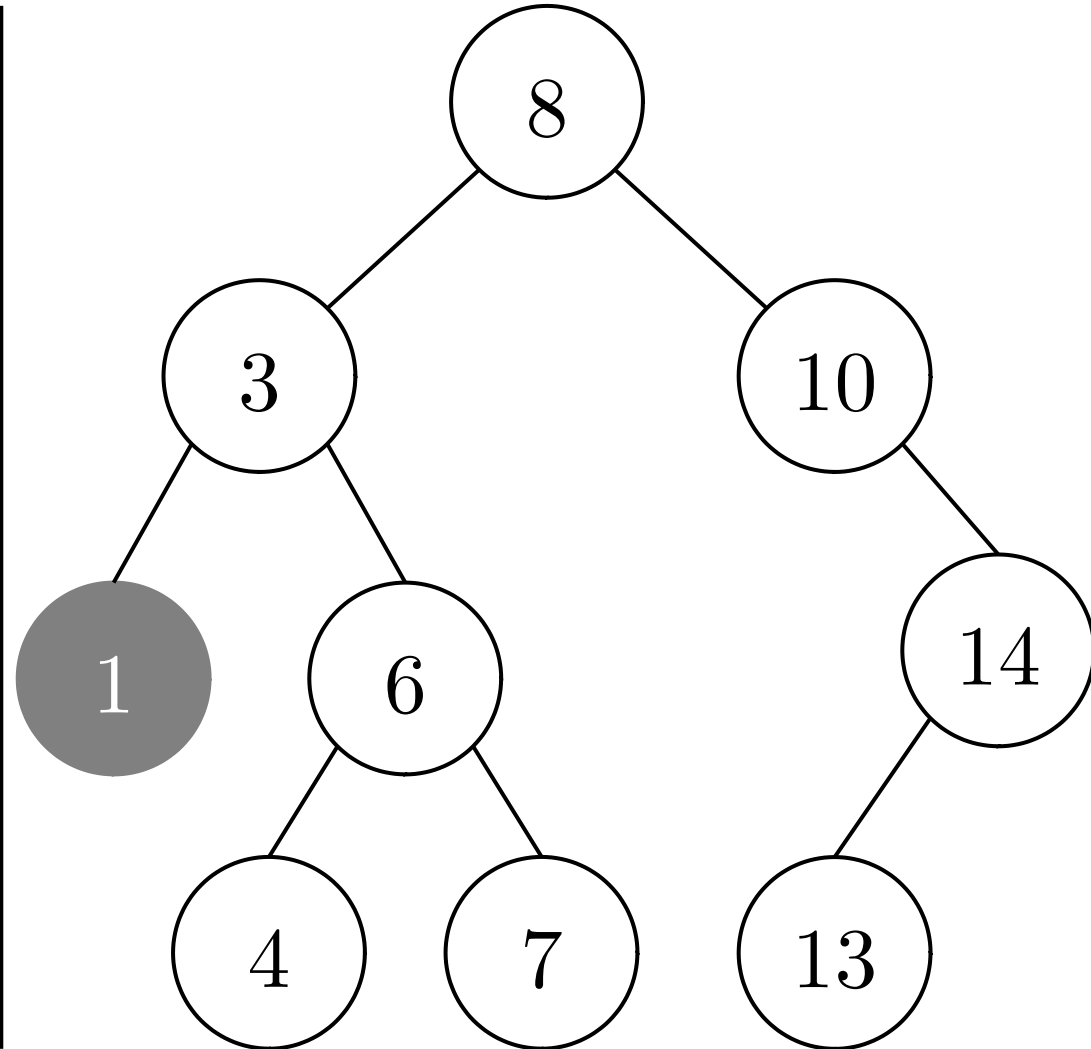
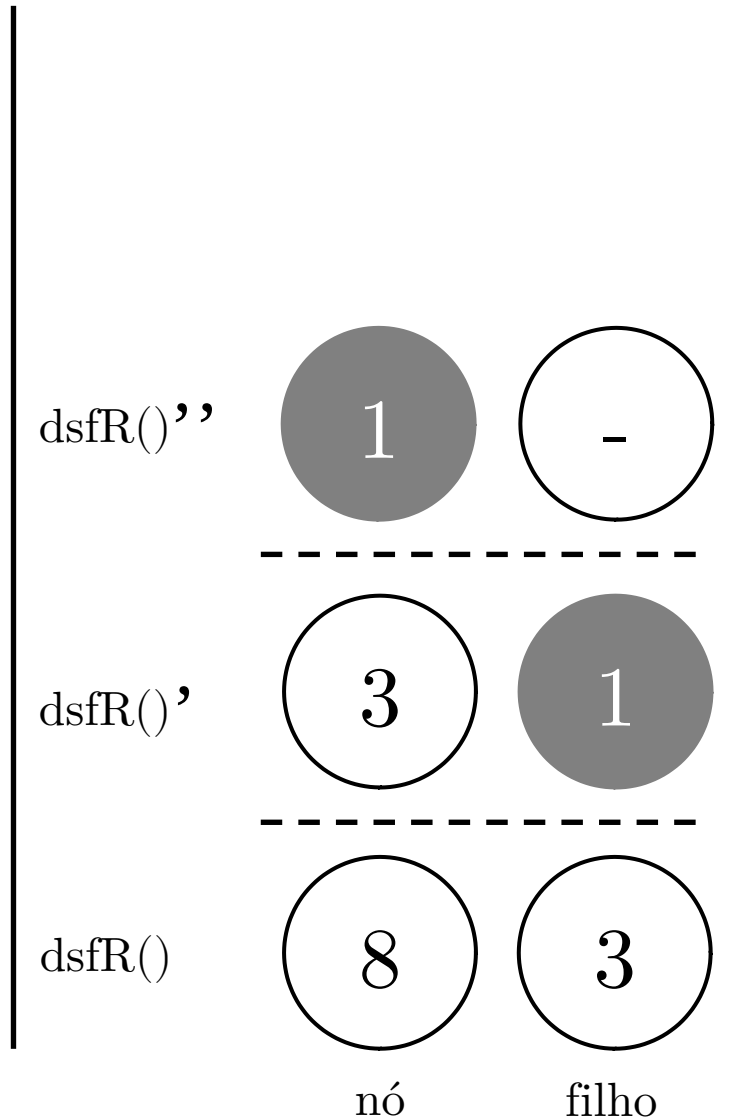
filho



busca em profundidade

RECURSIVO

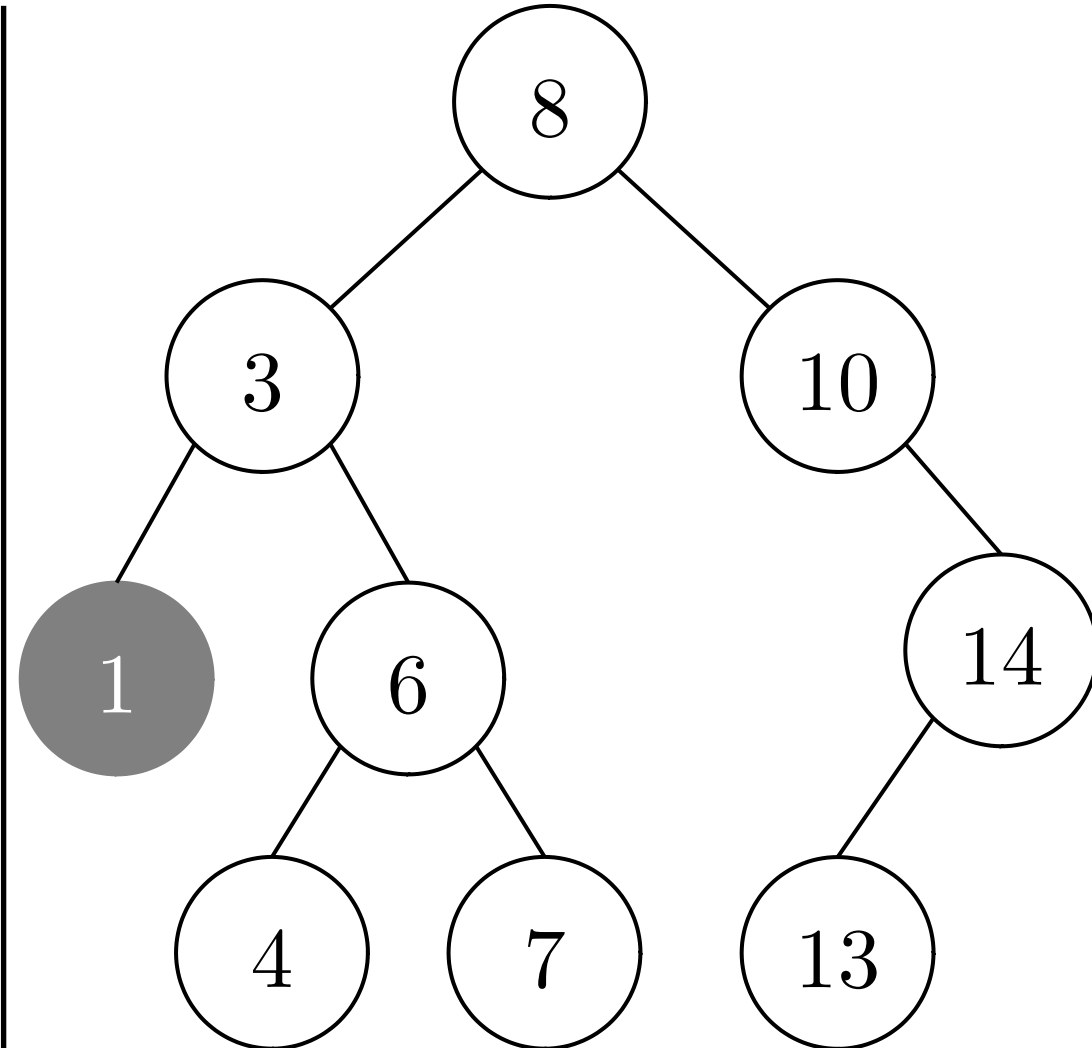
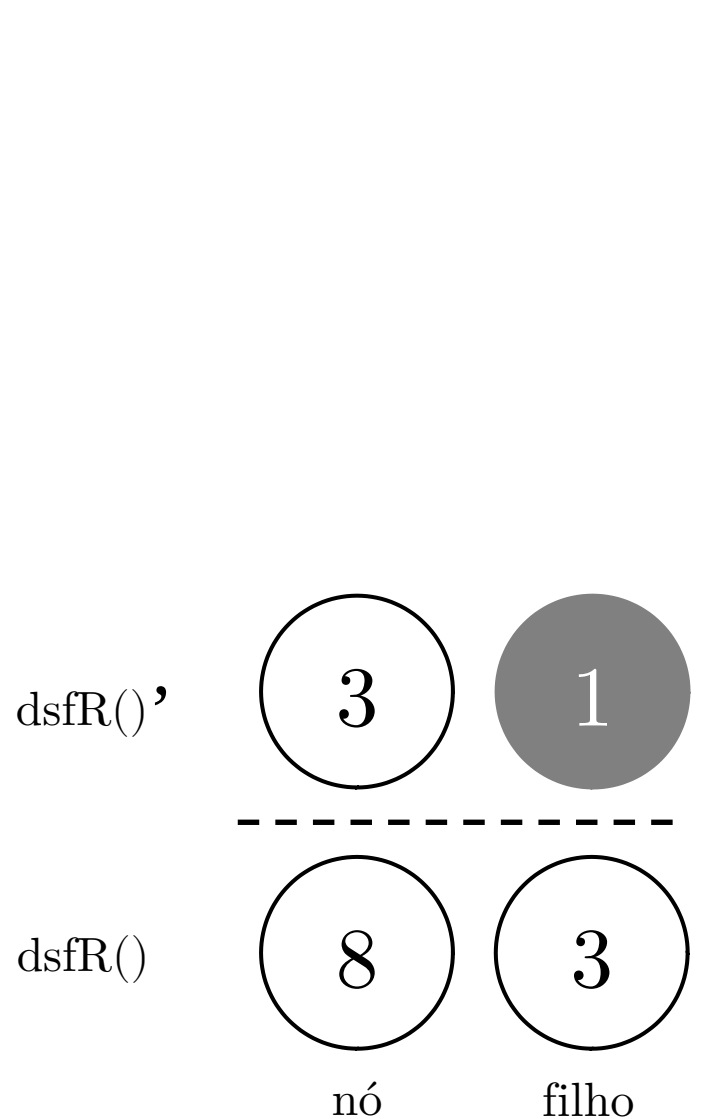
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busca em profundidade

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busca em profundidade

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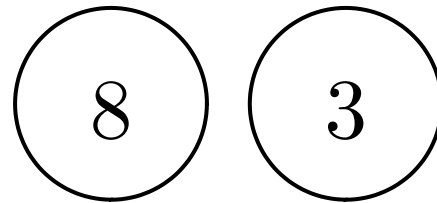
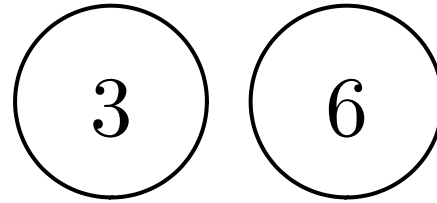
```
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```

```
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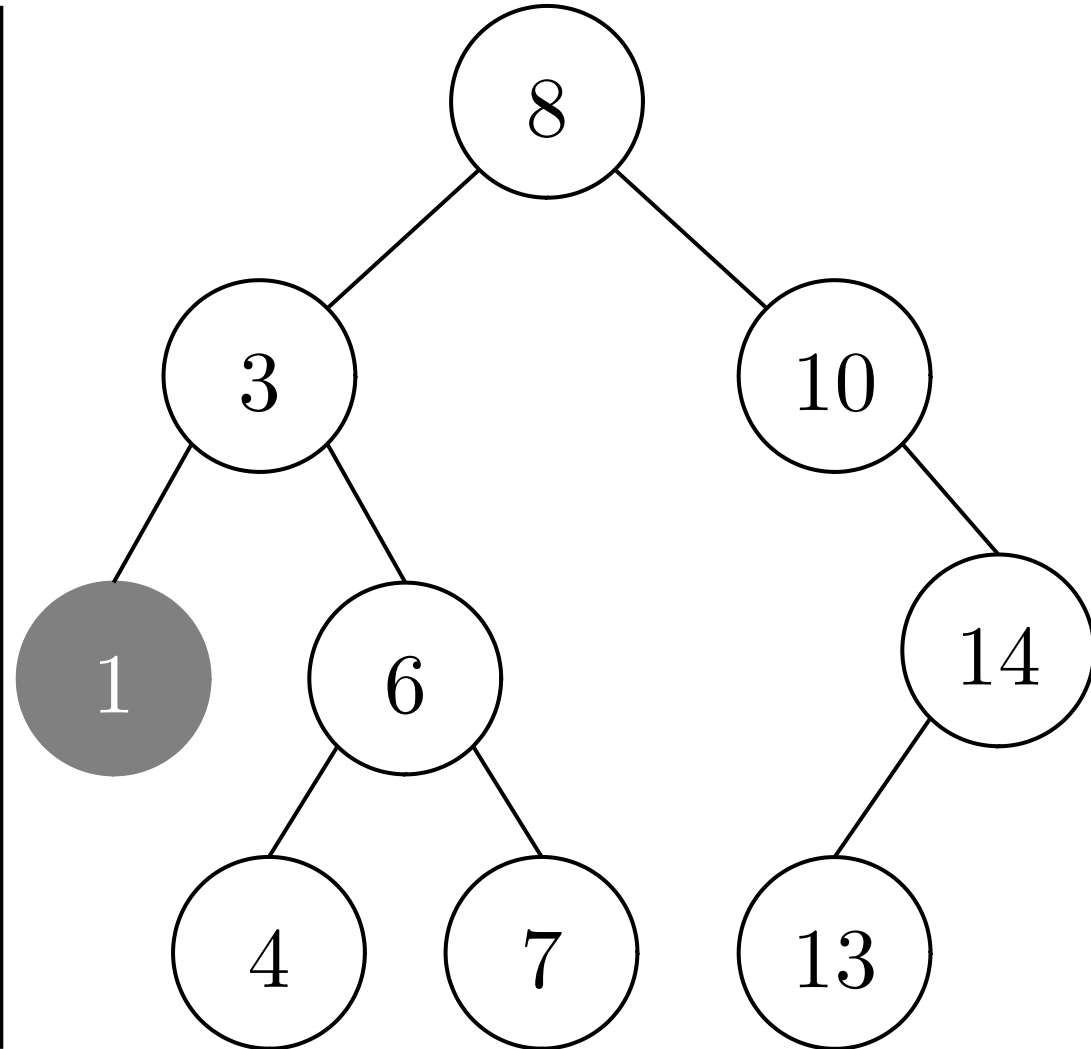
dfsR()'

dfsR()



nó

filho



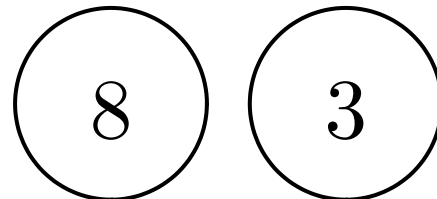
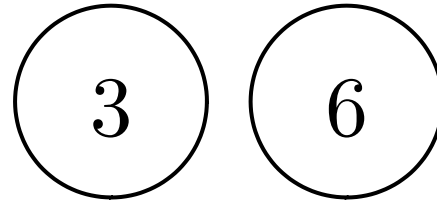
busca em profundidade

RECURSIVO

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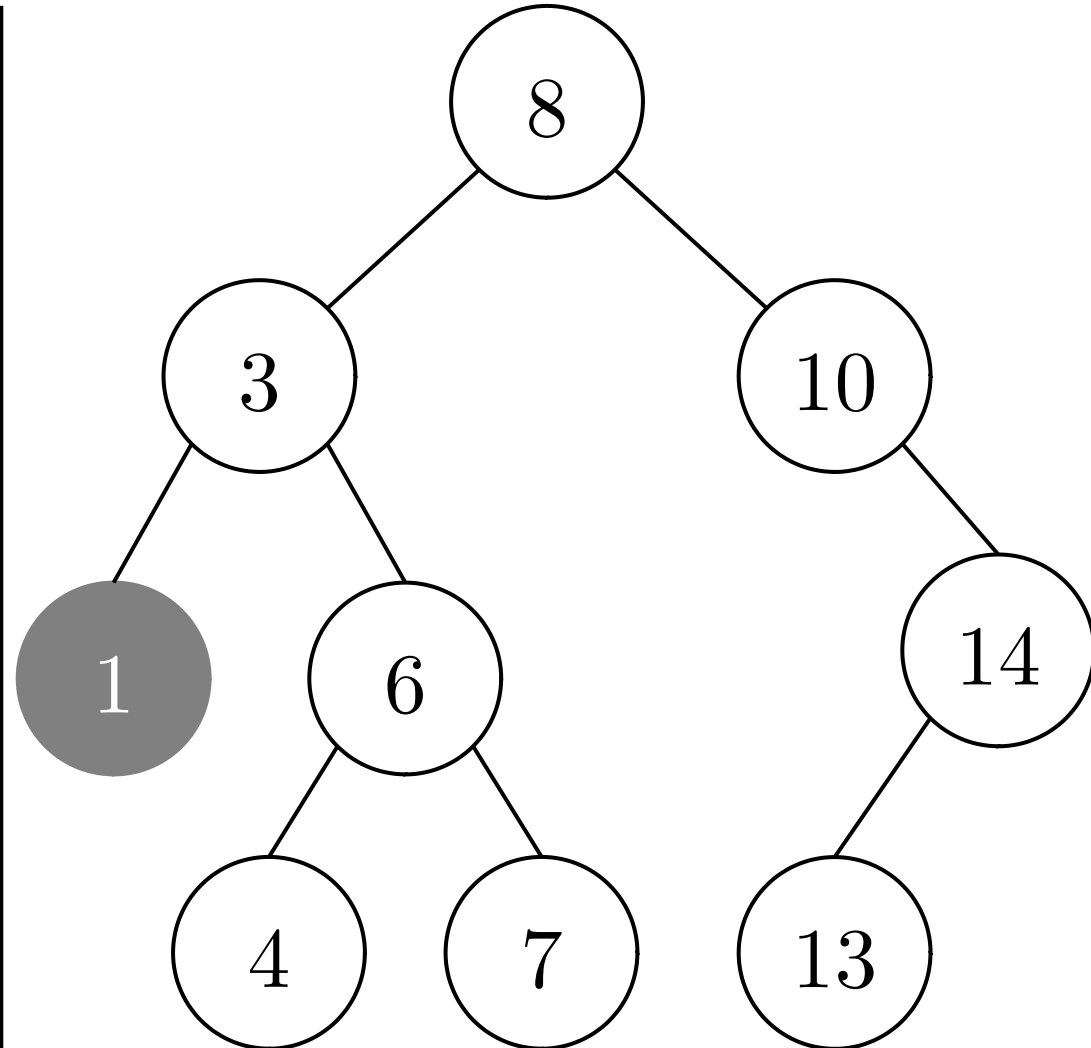
dfsR()'

dfsR()



nó

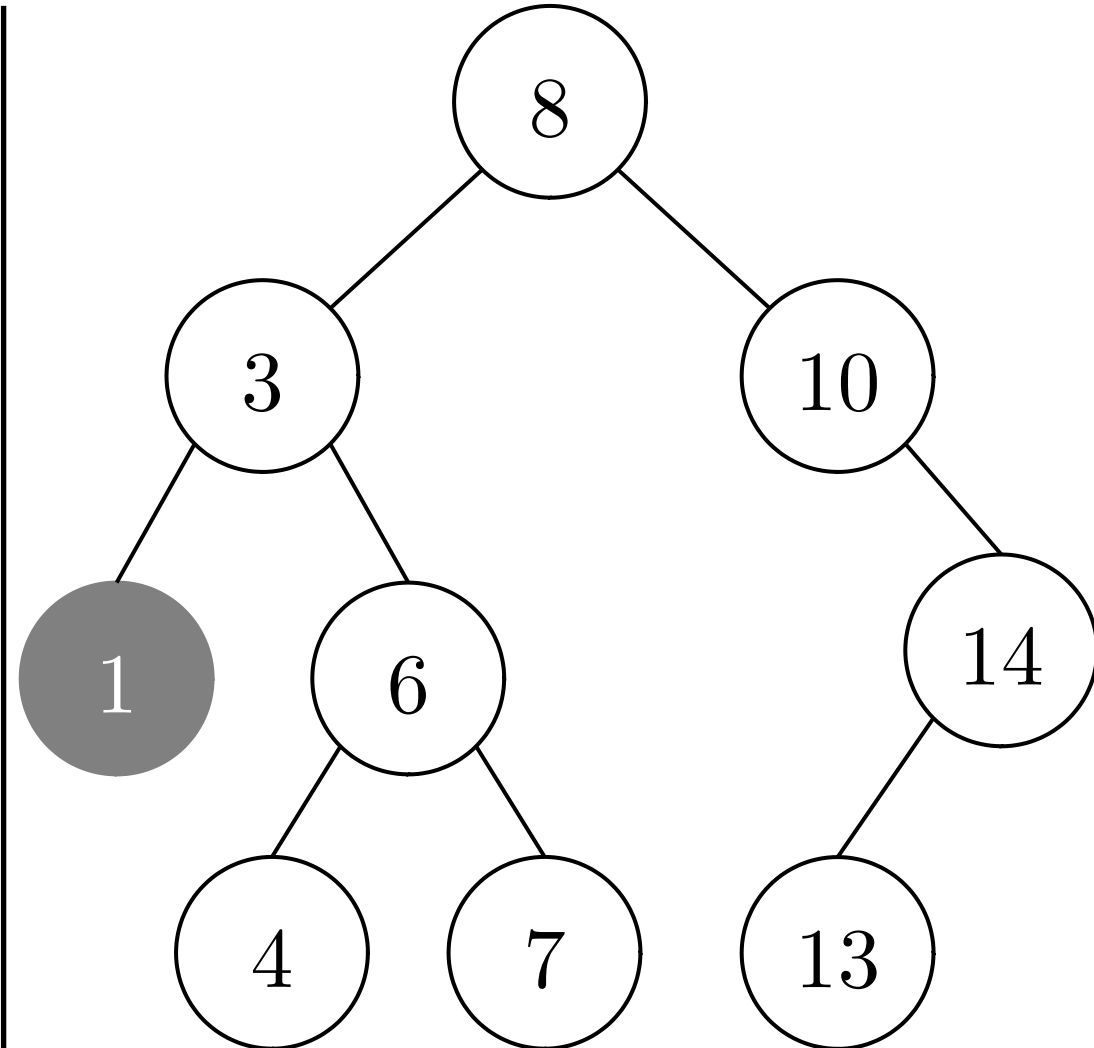
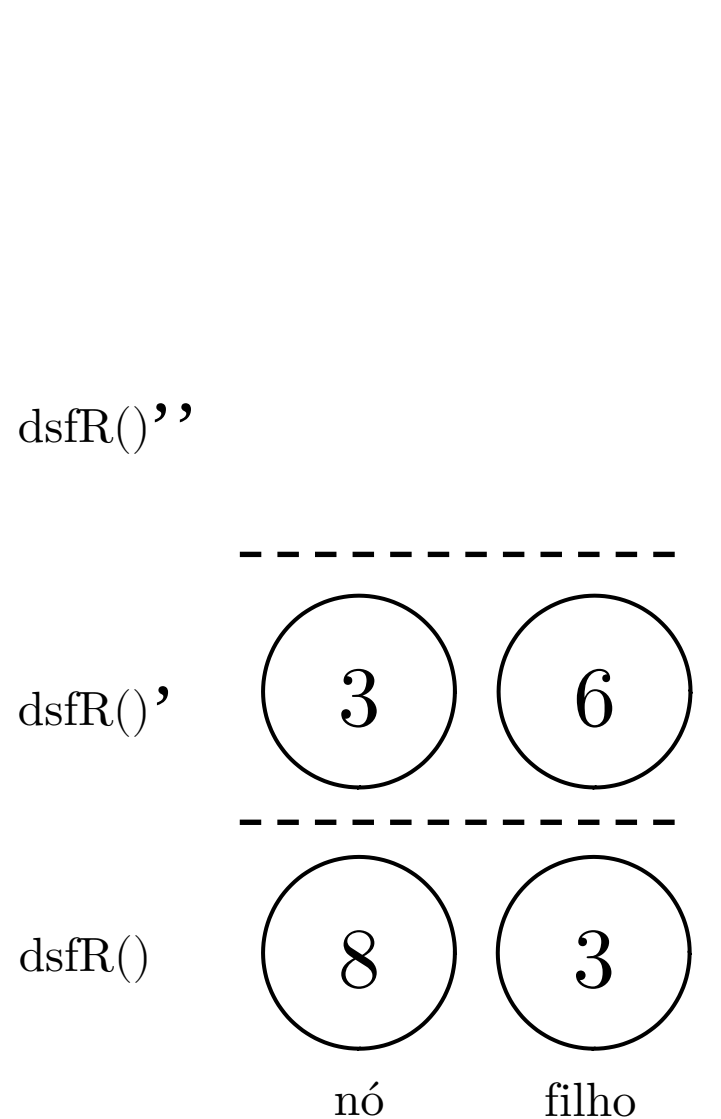
filho



busca em profundidade

RECURSIVO

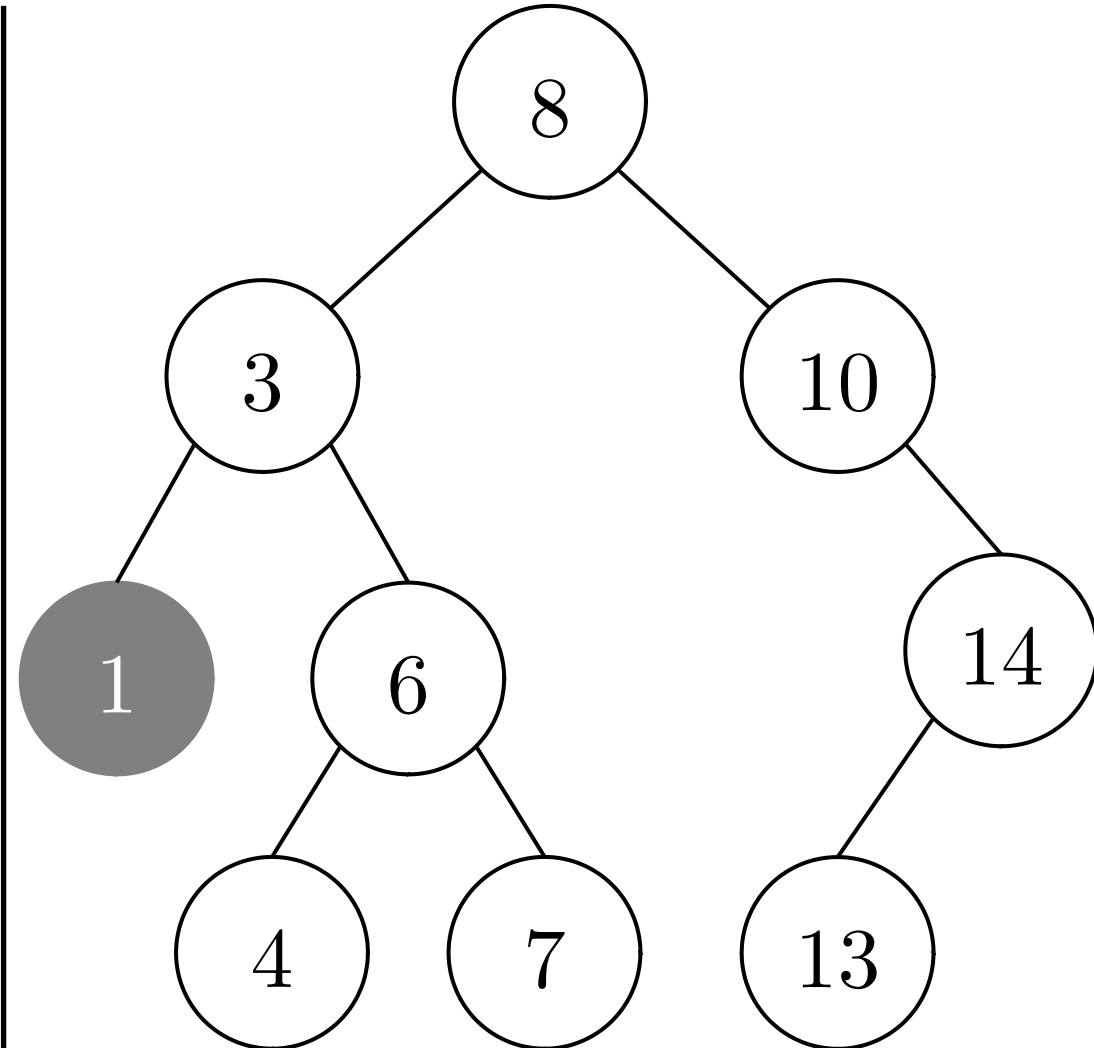
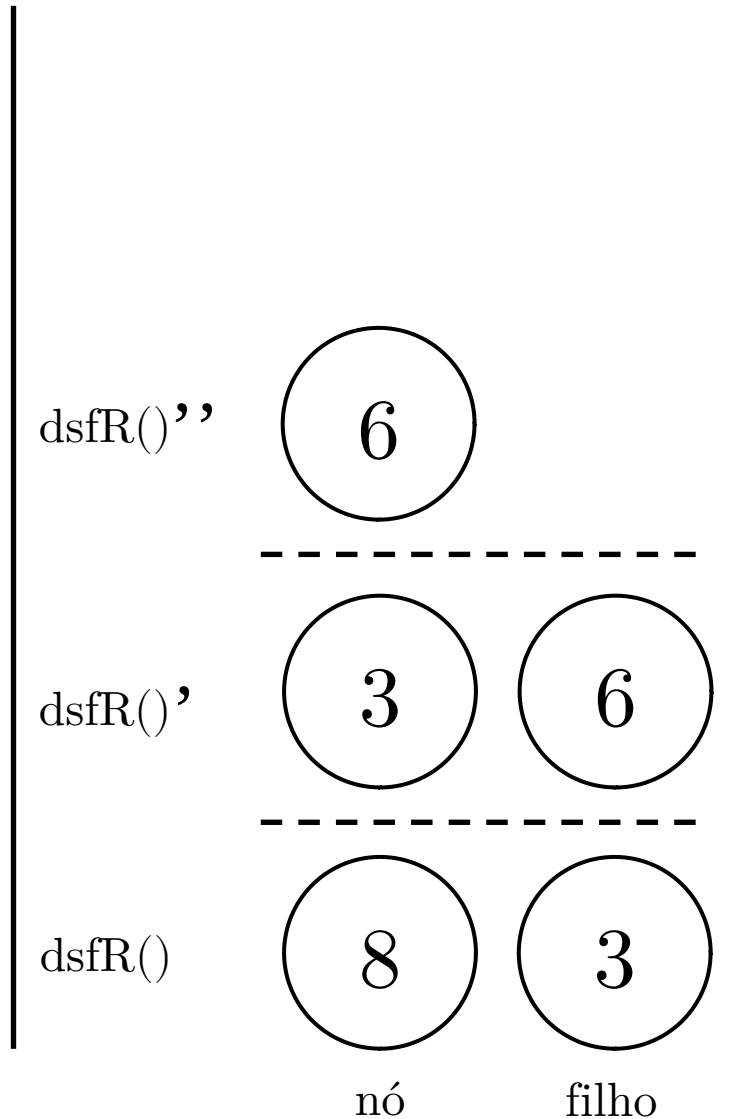
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busca em profundidade

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busca em profundidade

RECURSIVO

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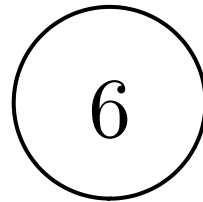
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```

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```

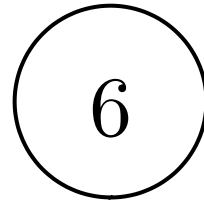
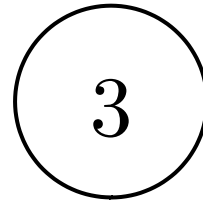
```
            dfsR(filho)
```

```
    nó.visitado = True
```

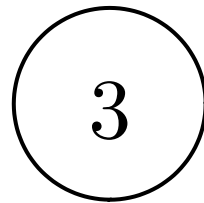
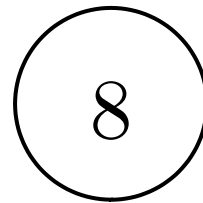
dfsR()''



dfsR()'

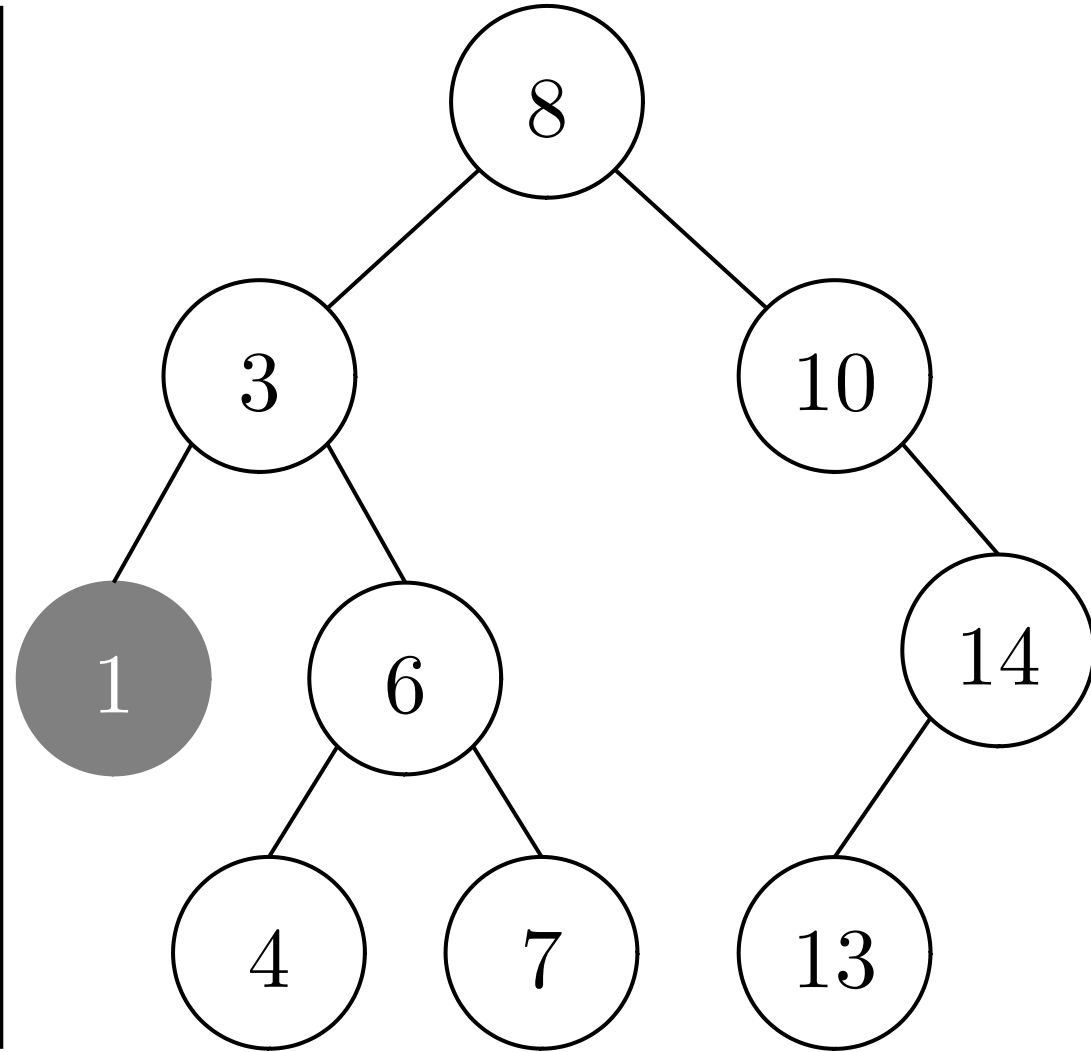


dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

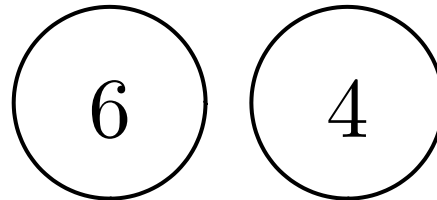
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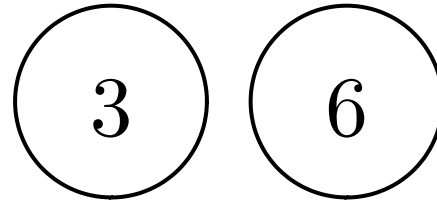
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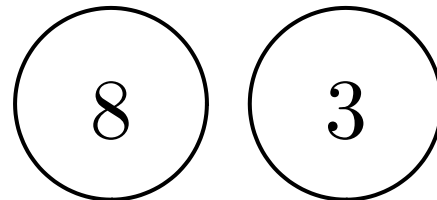
dfsR()''



dfsR()'

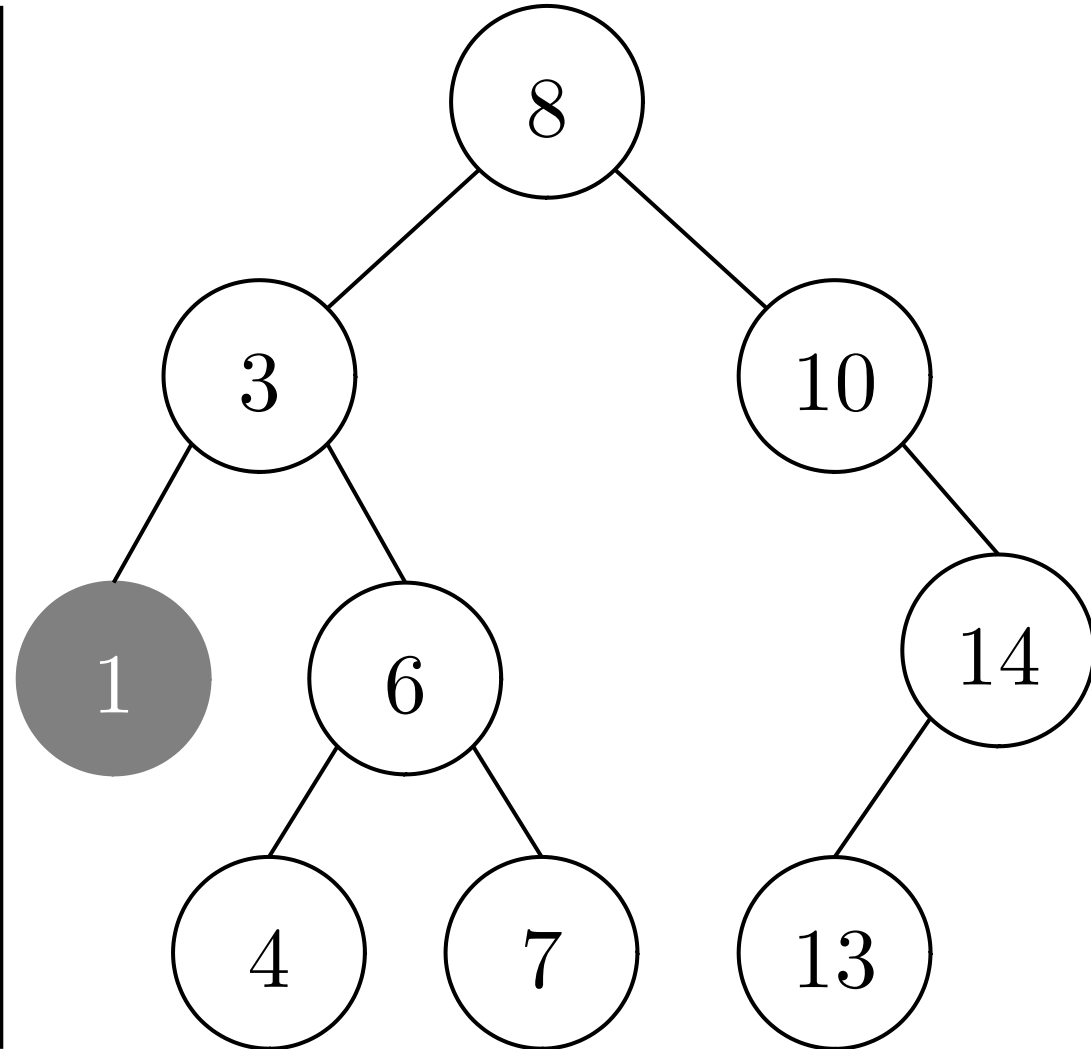


dfsR()



nó

filho



busca em profundidade

RECURSIVO

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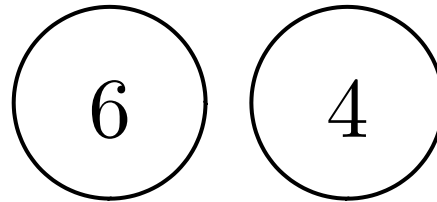
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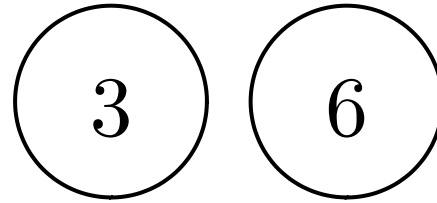
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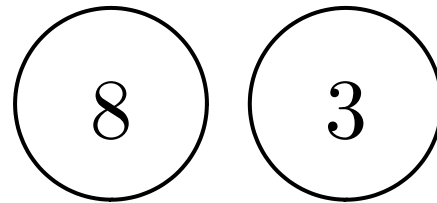
dfsR()''



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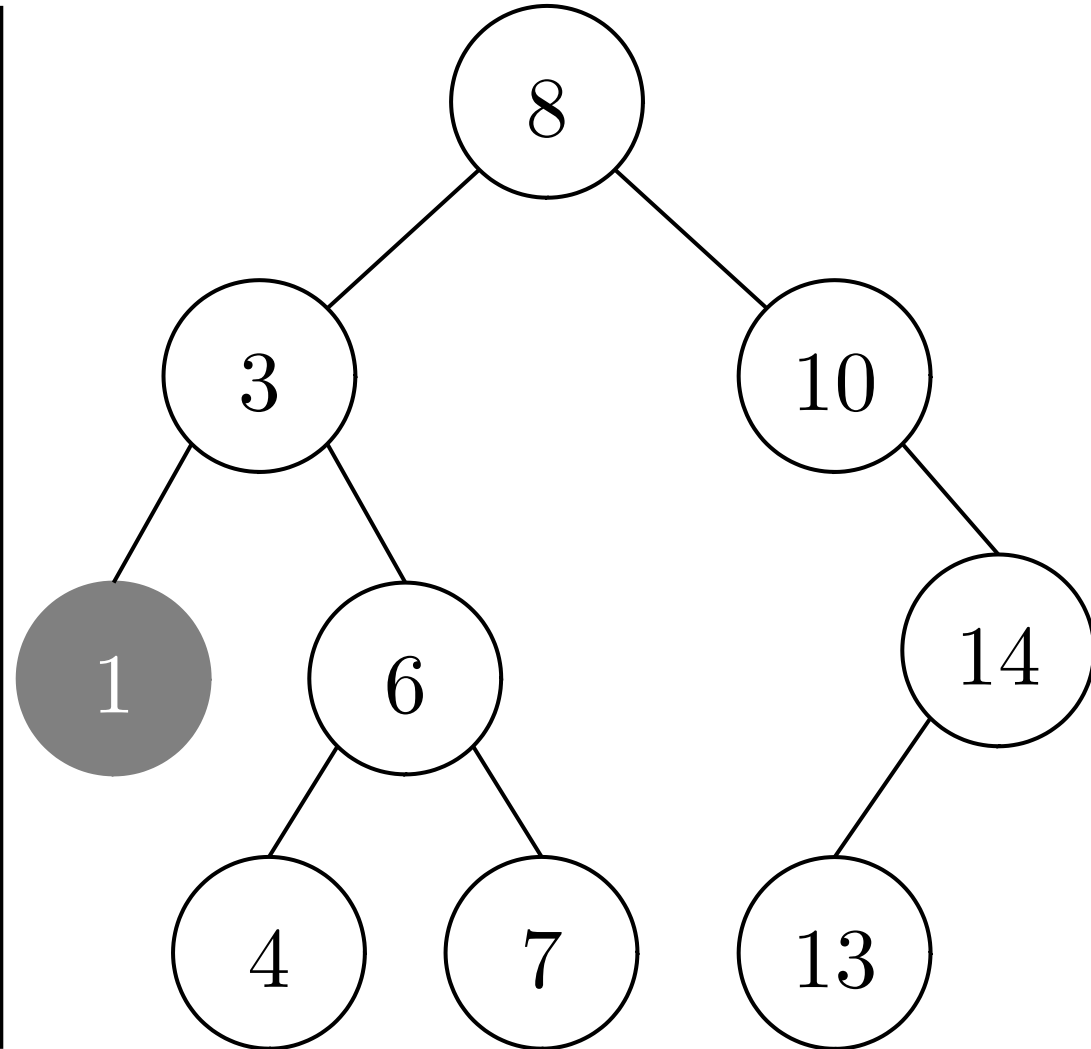


dfsR()



nó

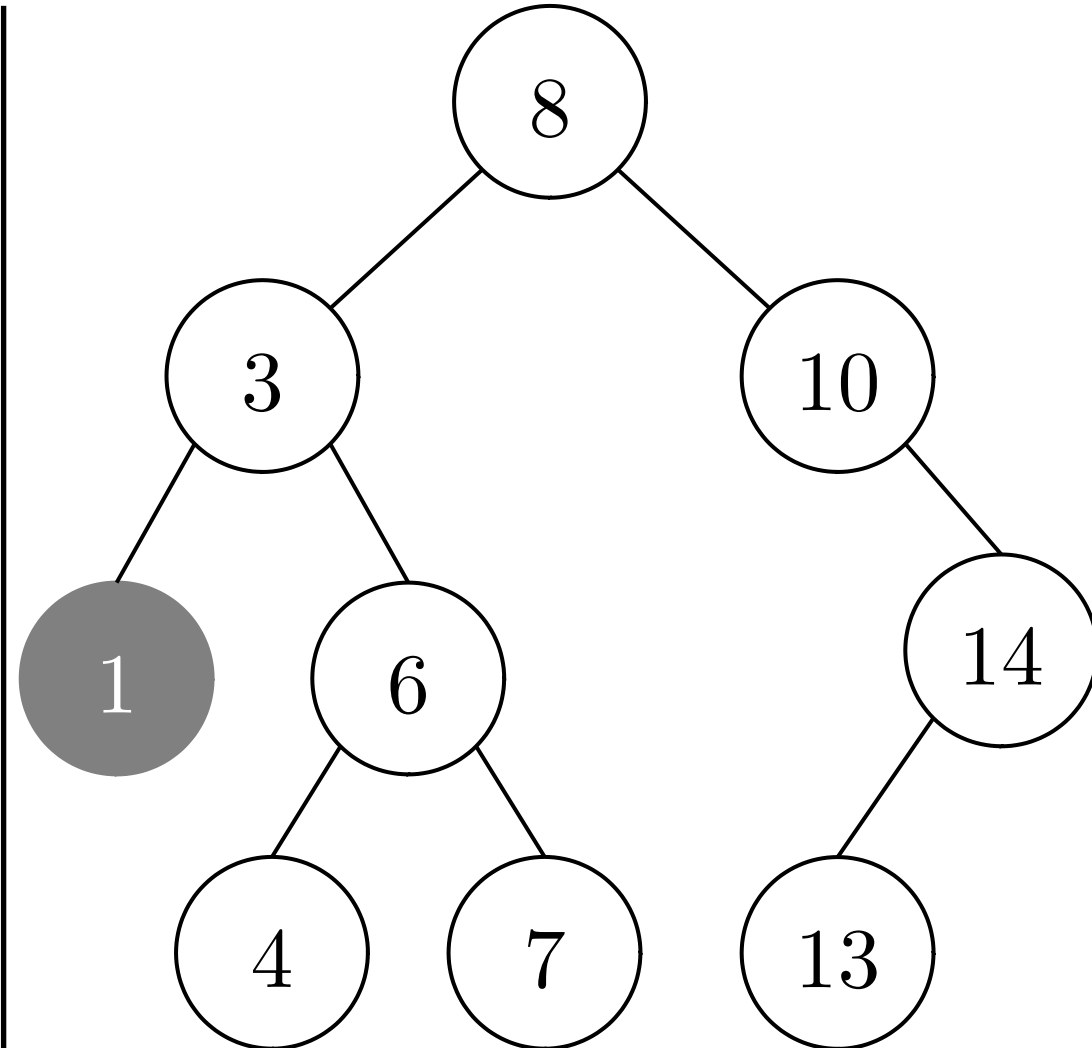
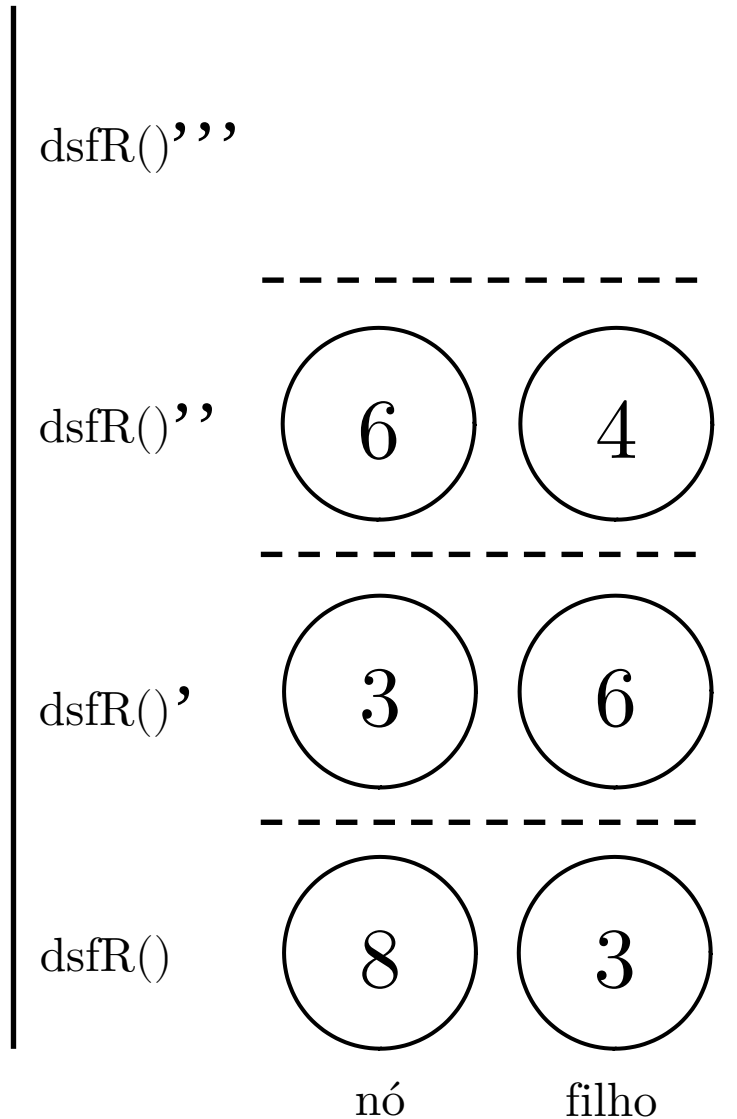
filho



busca em profundidade

RECURSIVO

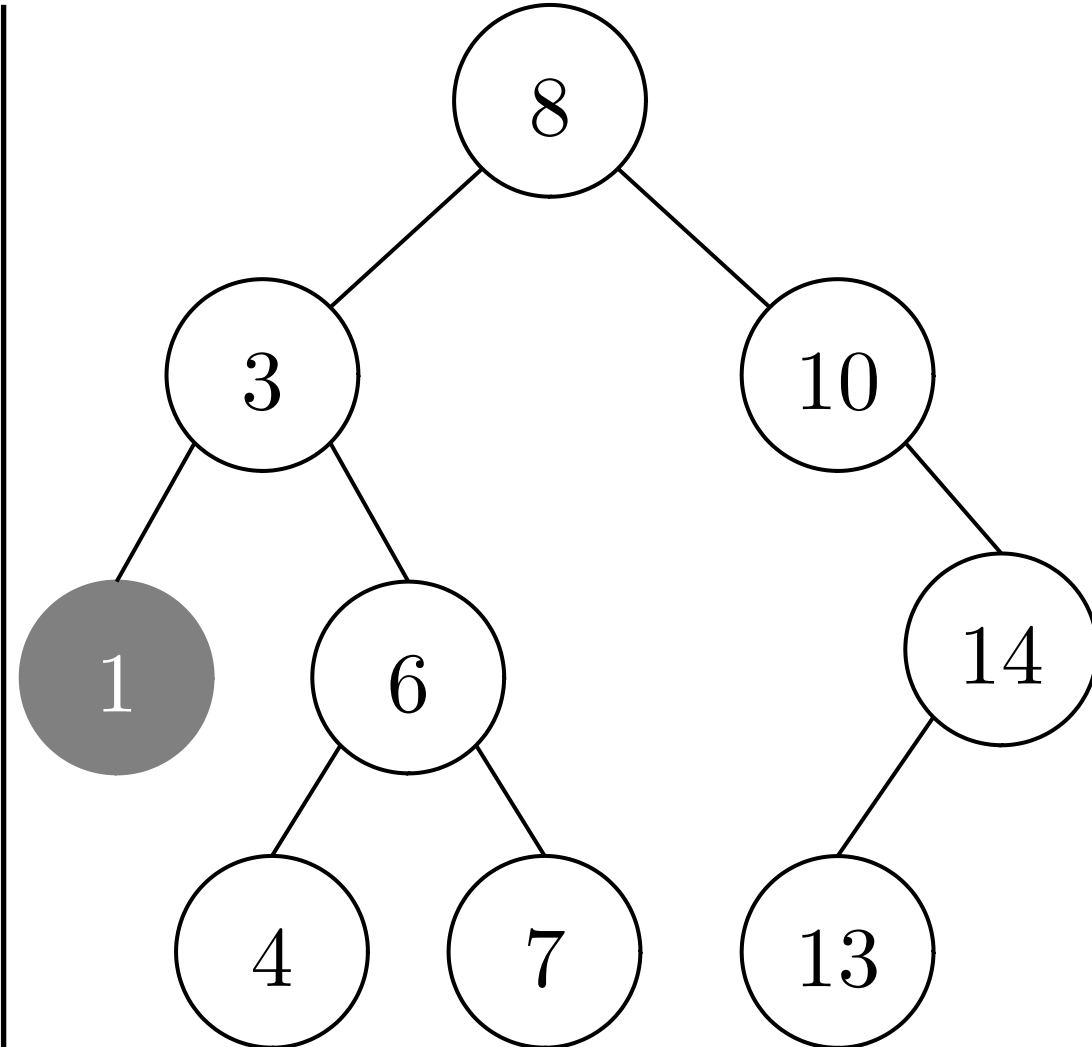
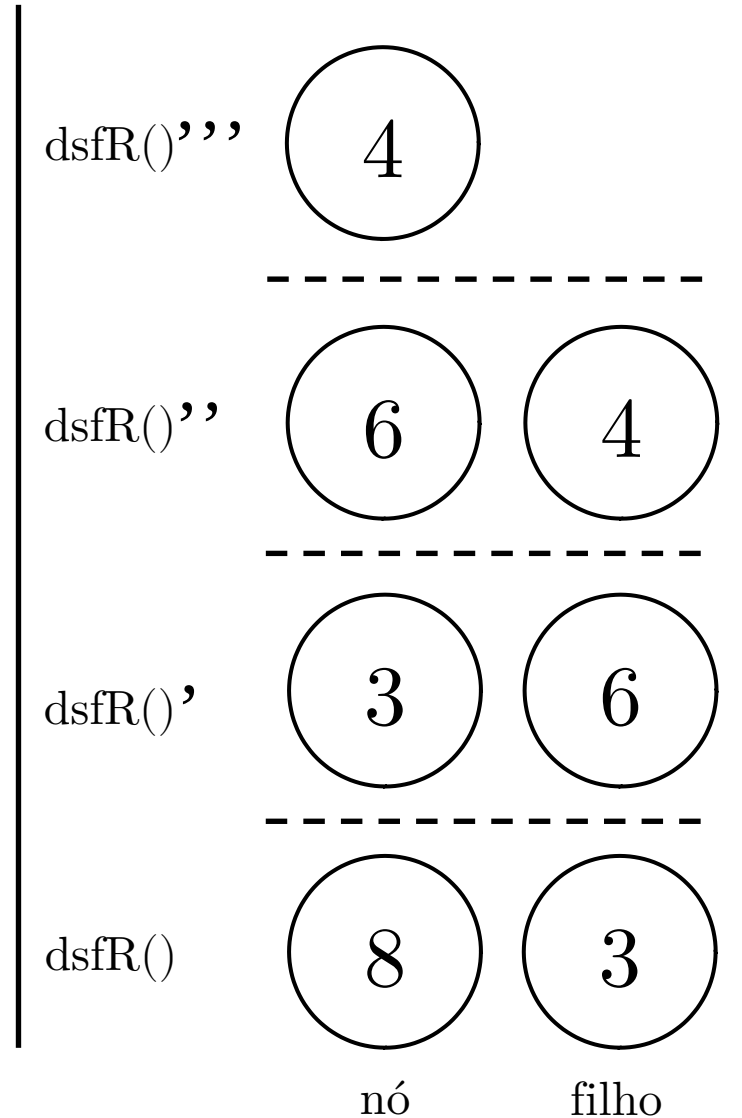
def dfsR(nó):
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busca em profundidade

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busca em profundidade

RECURSIVO

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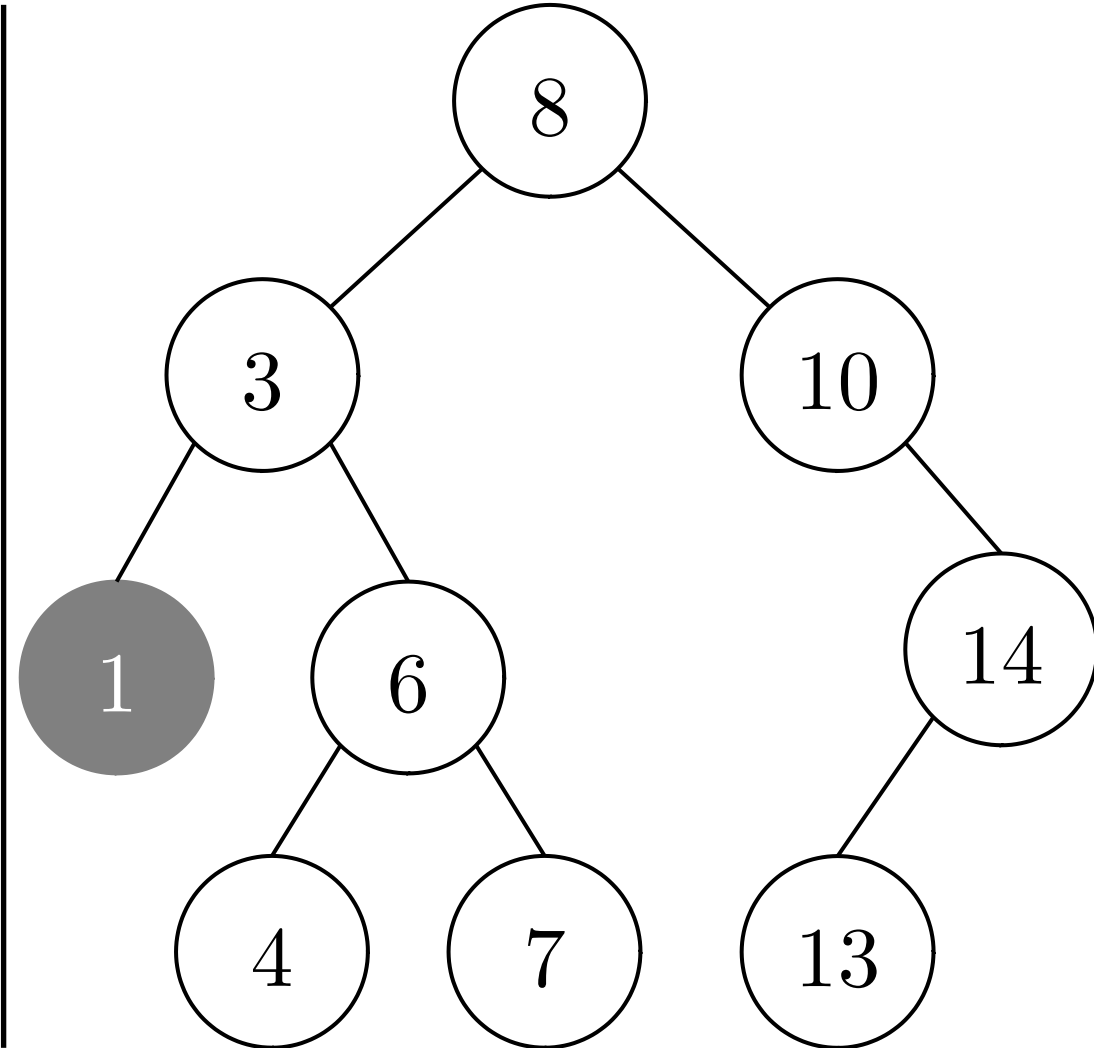
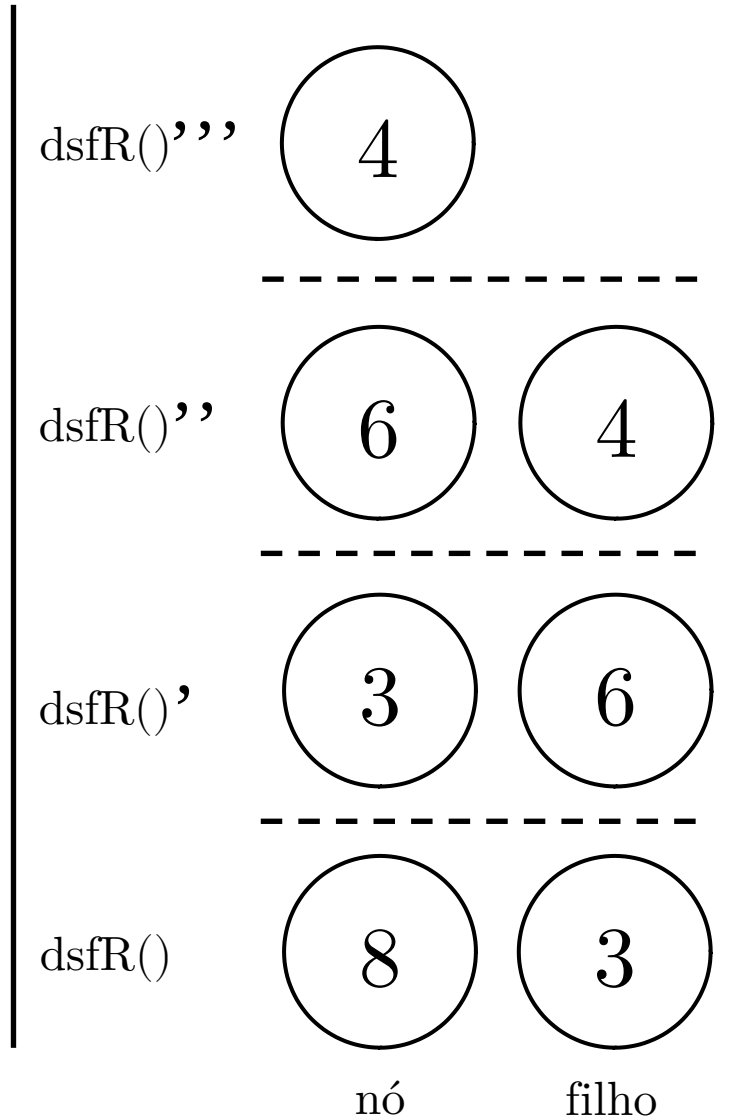
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busca em profundidade

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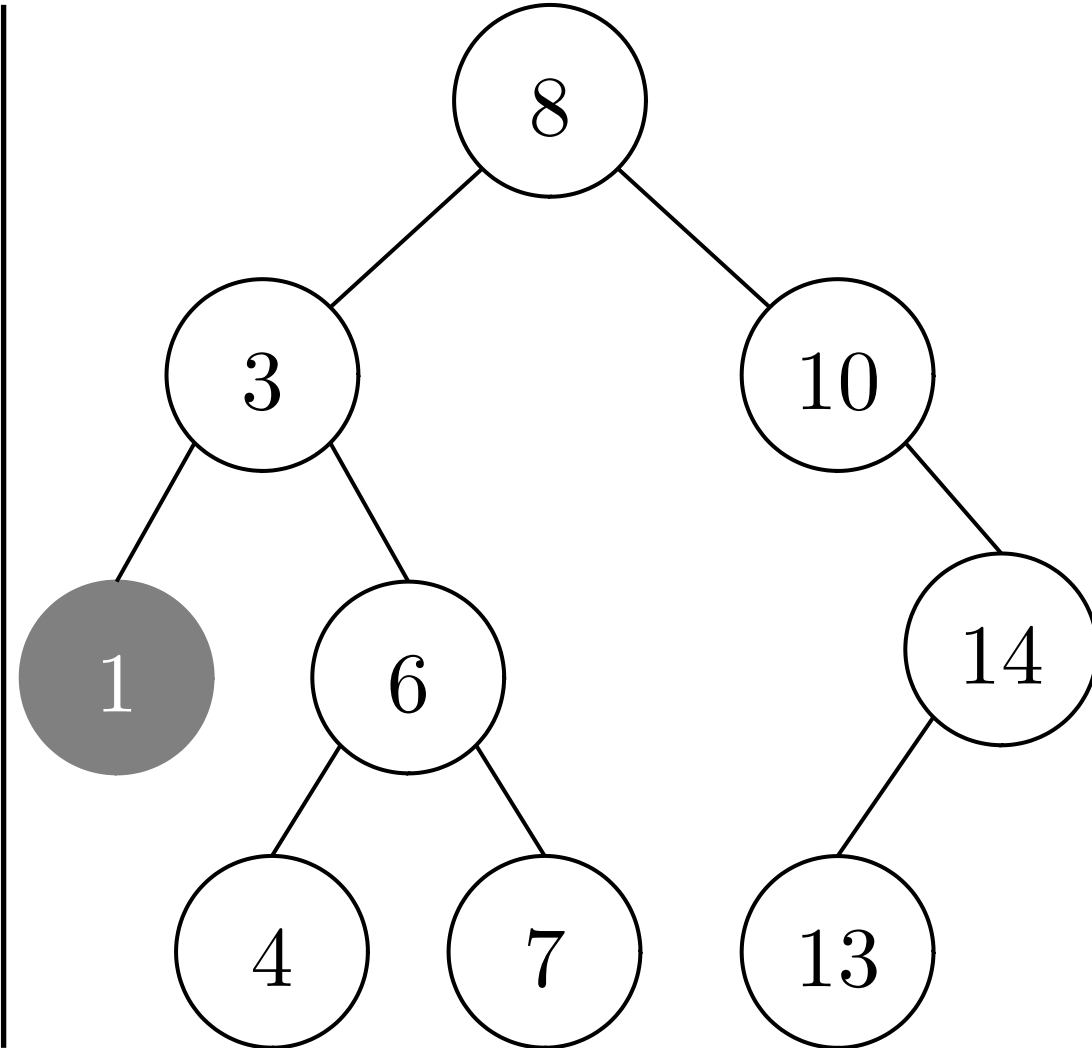
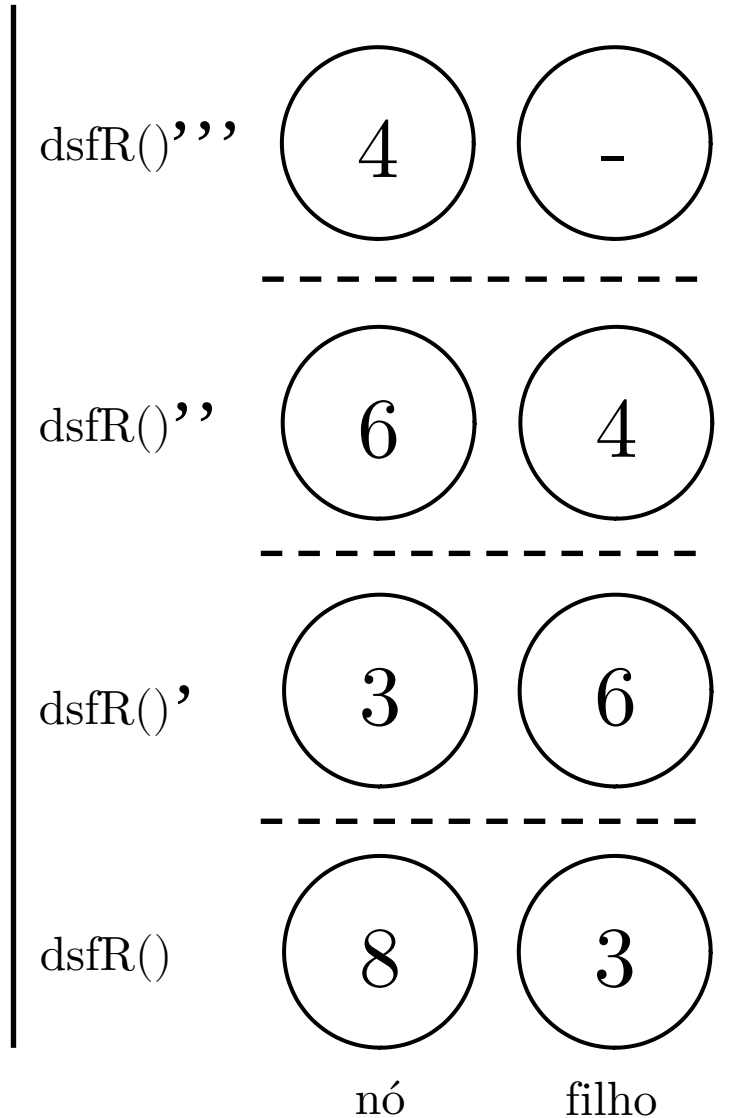
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busca em profundidade

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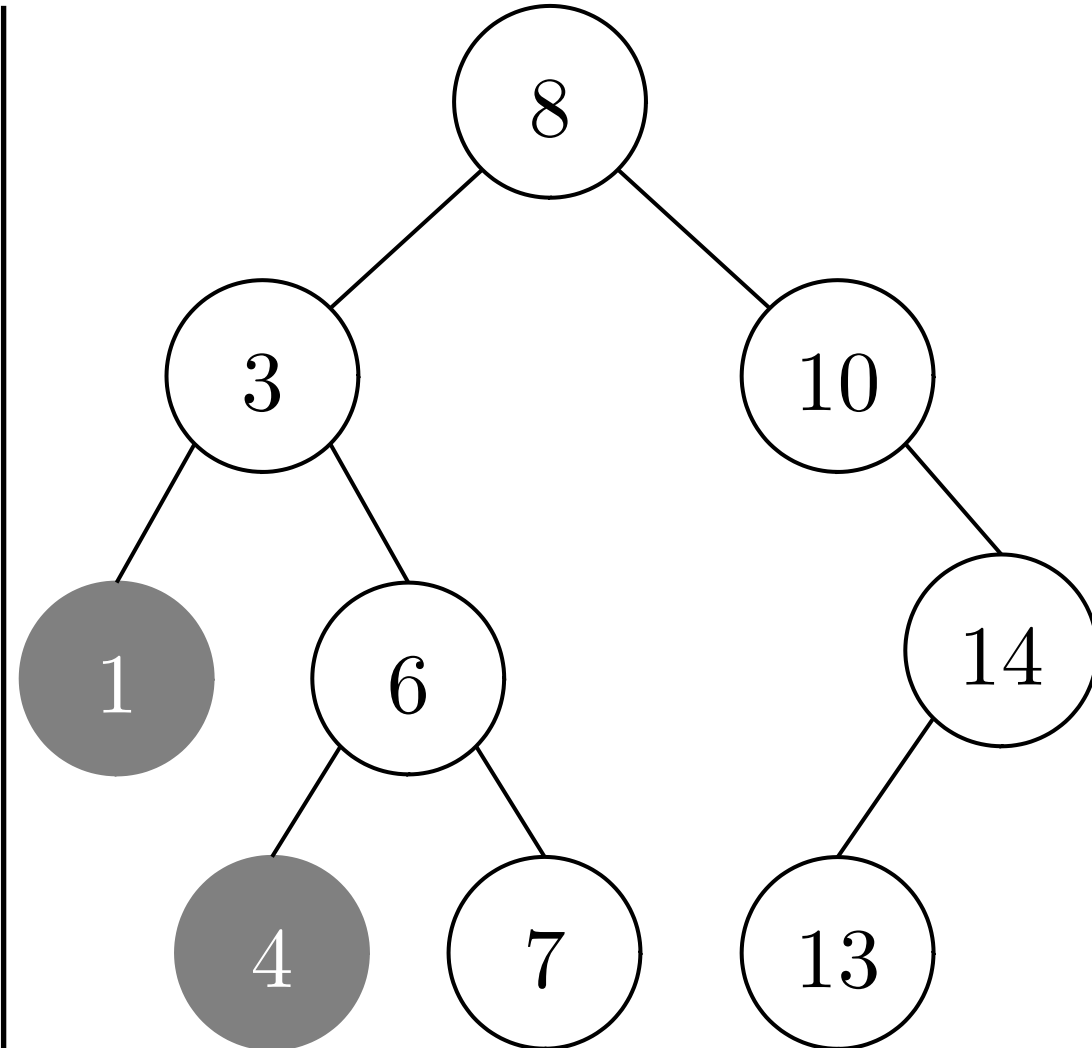
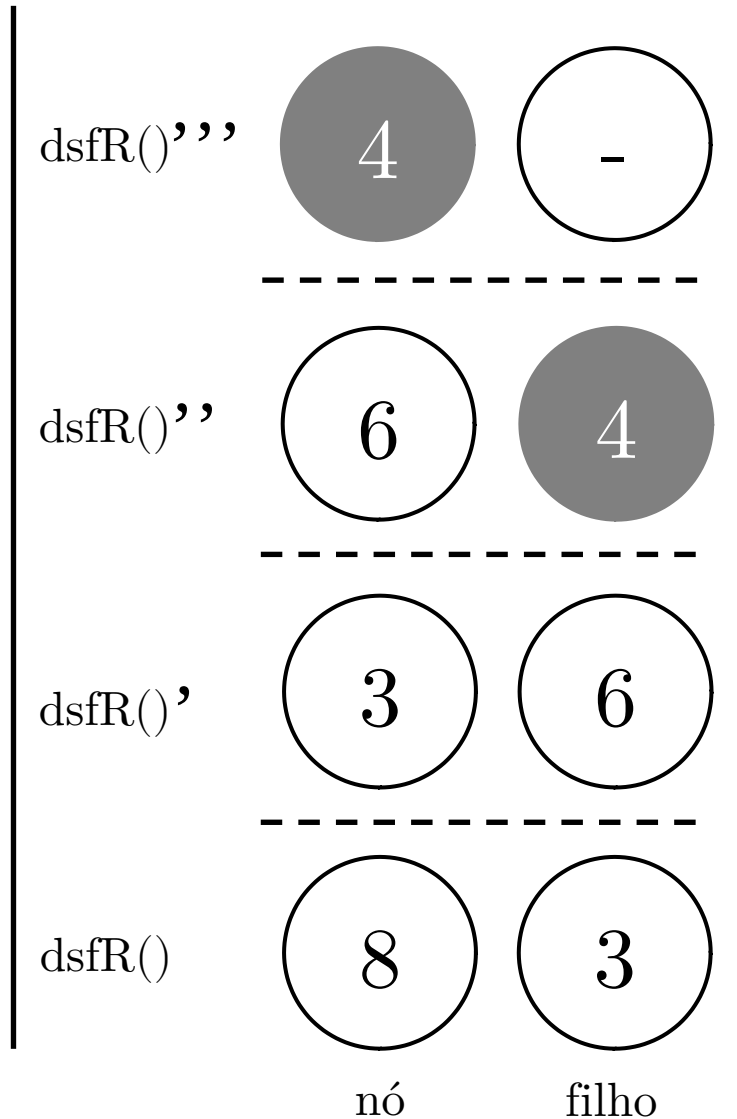
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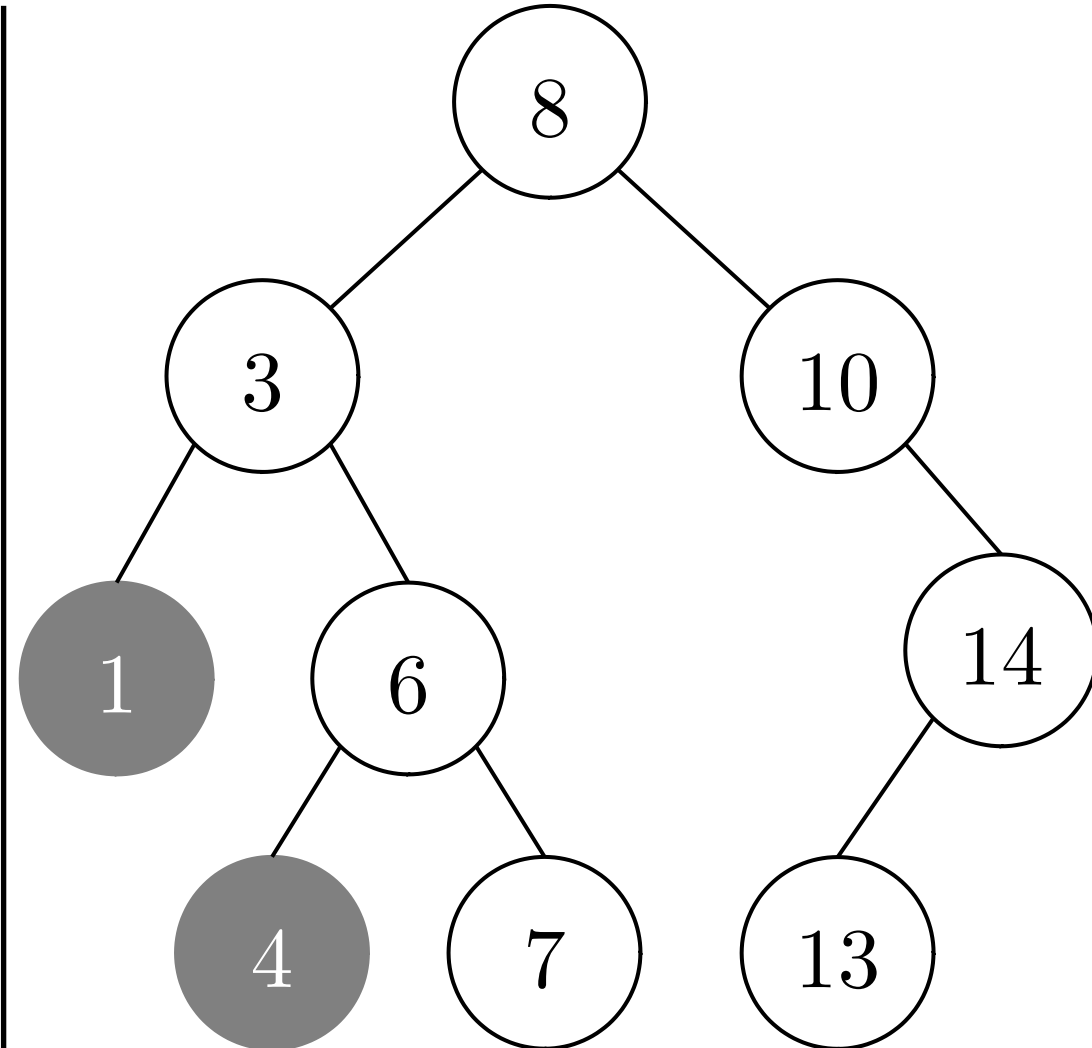
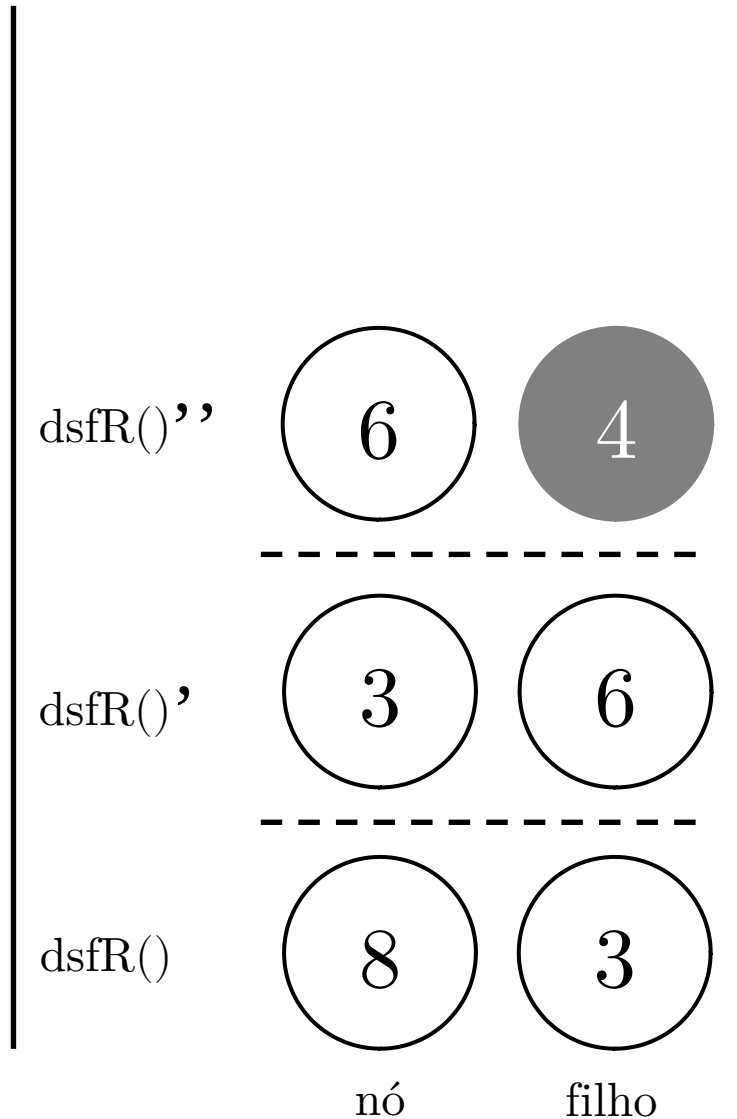
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busca em profundidade

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        return
```

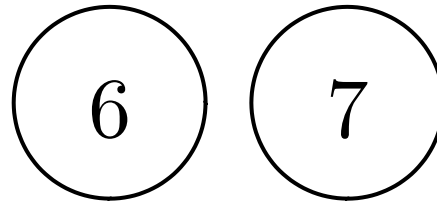
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

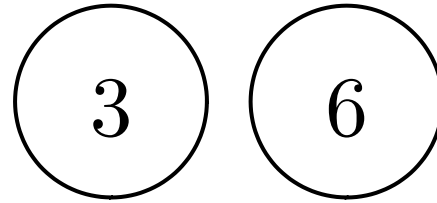
```
            dfsR(filho)
```

```
    nó.visitado = True
```

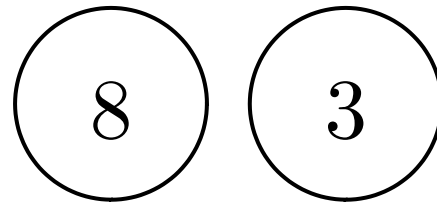
dfsR()''



dfsR()'

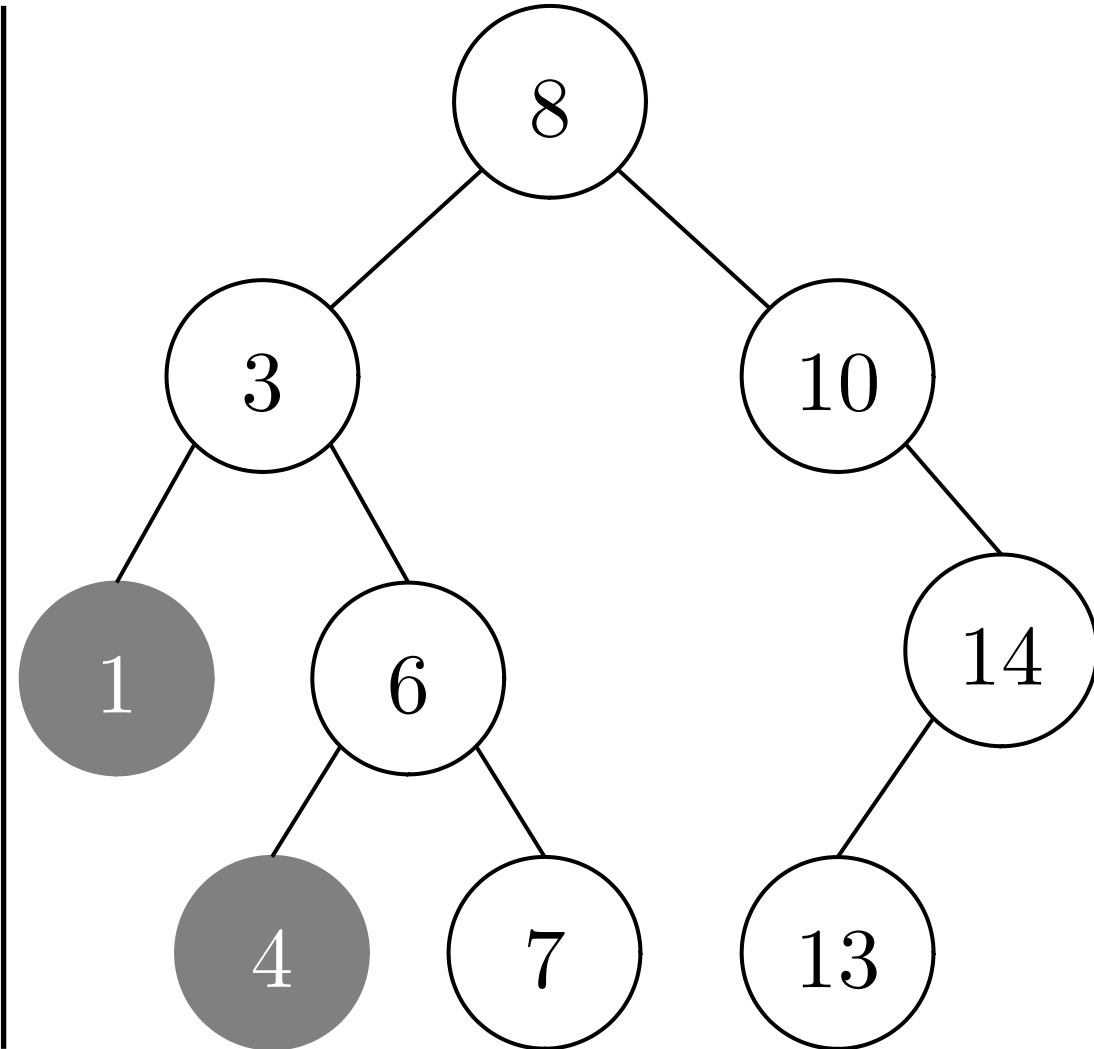


dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

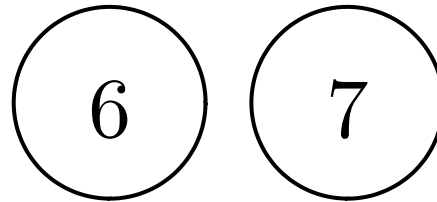
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

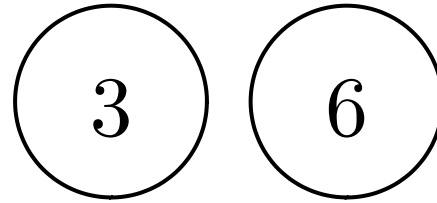
```
            dfsR(filho)
```

```
    nó.visitado = True
```

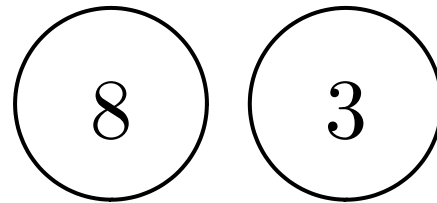
dfsR()''



dfsR()'

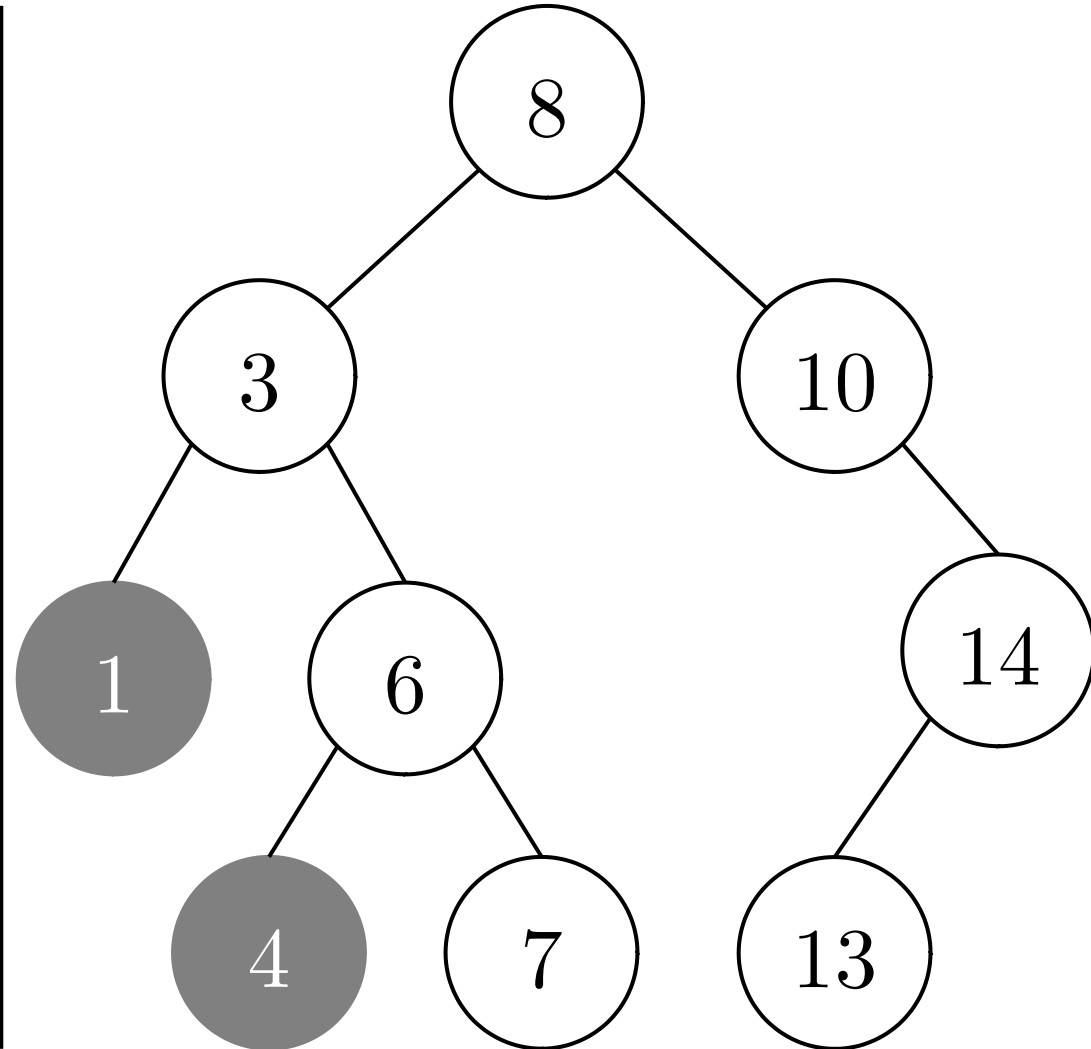


dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

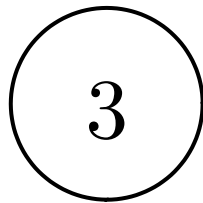
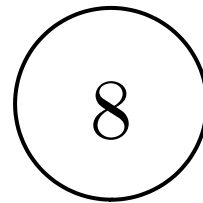
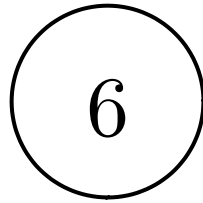
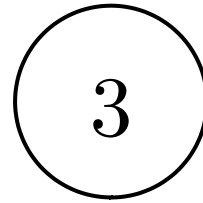
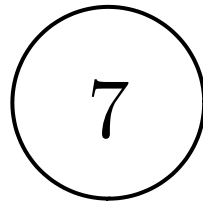
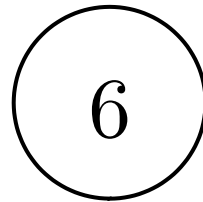
```
    nó.visitado = True
```

dfsR()'''

dfsR()''

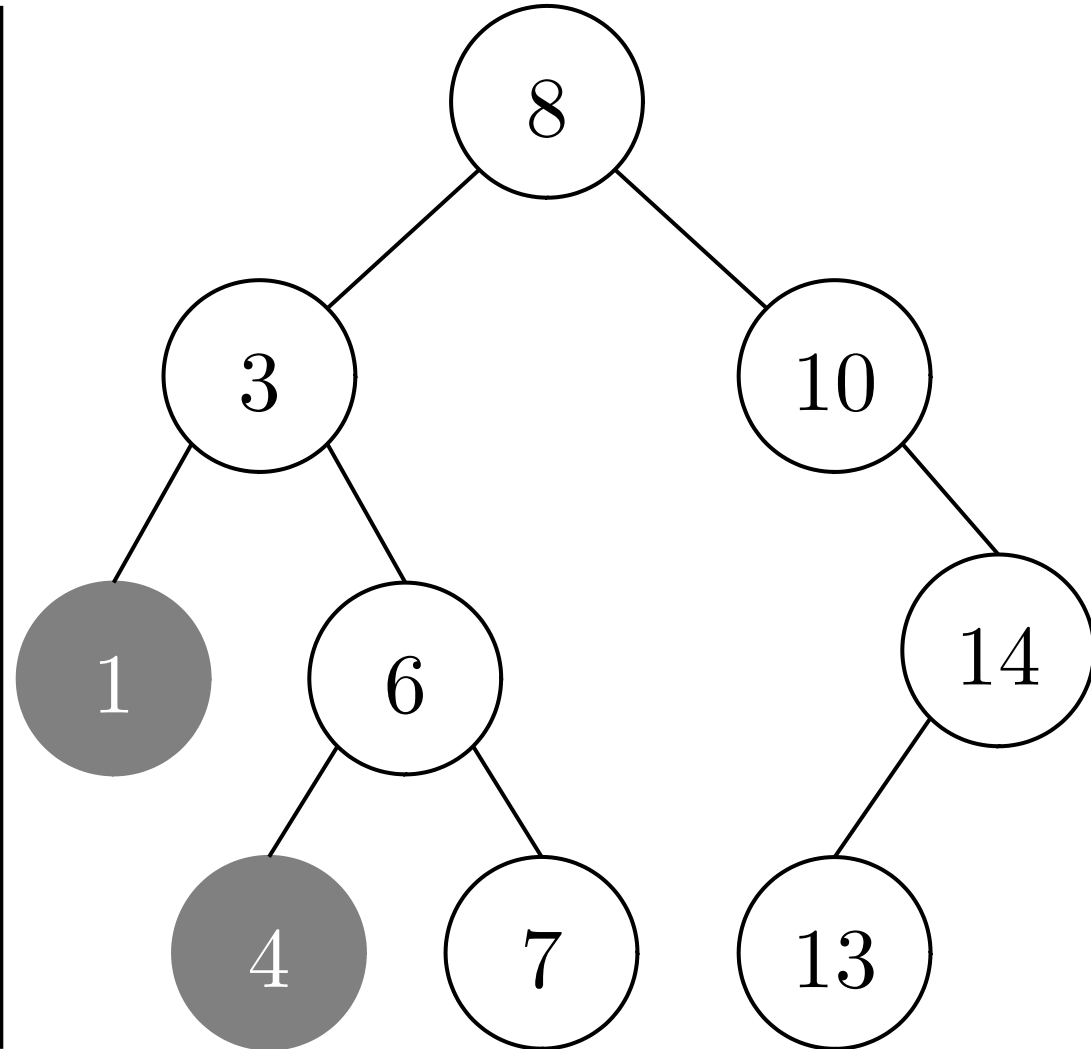
dfsR()'

dfsR()



nó

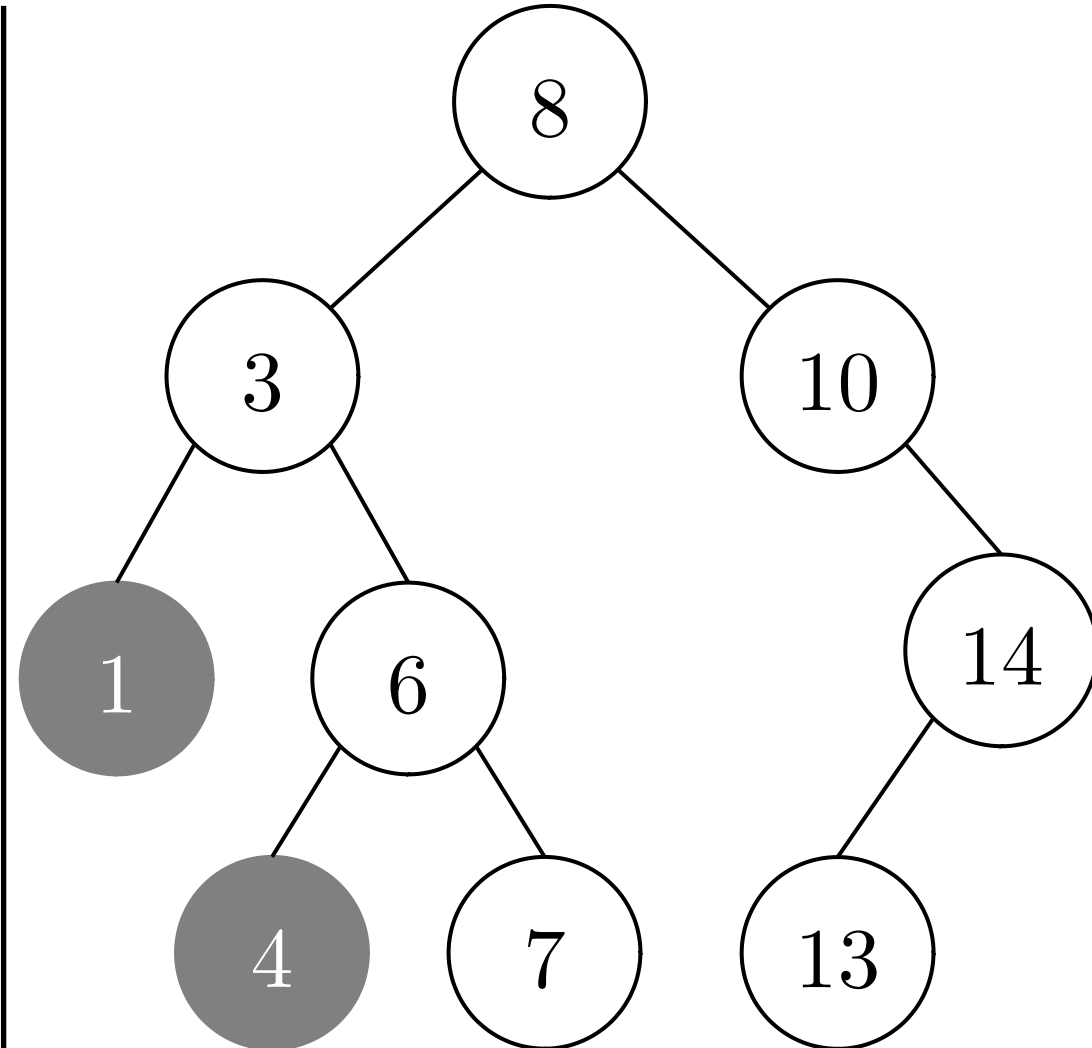
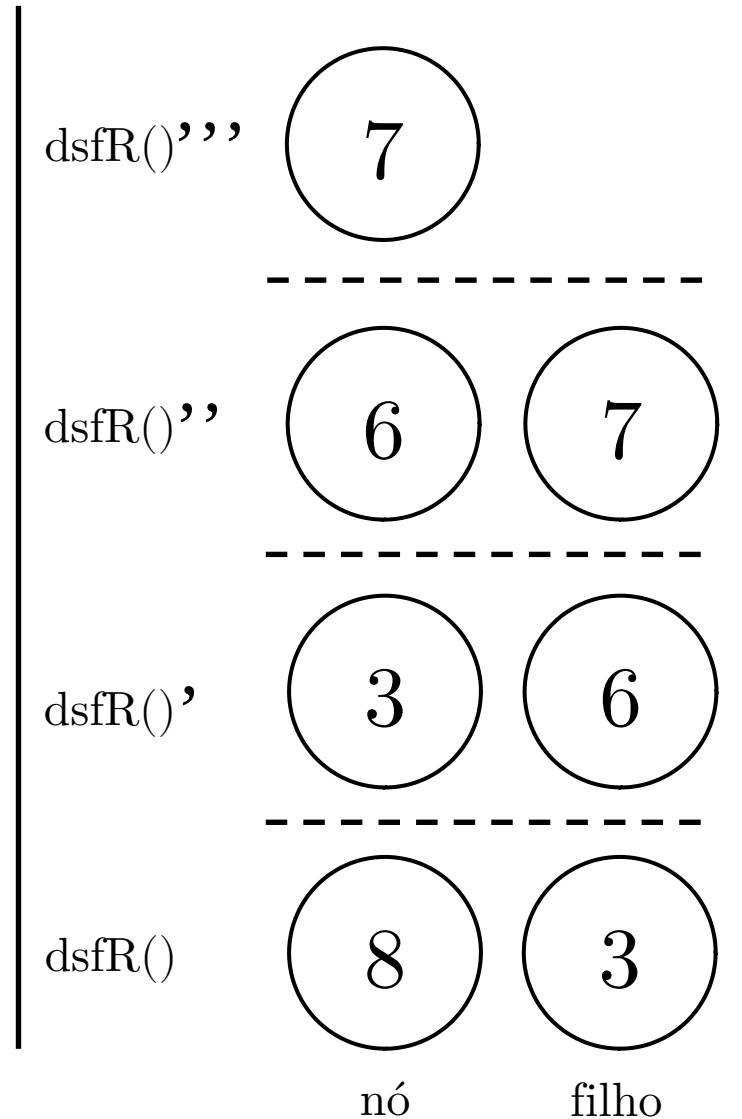
filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

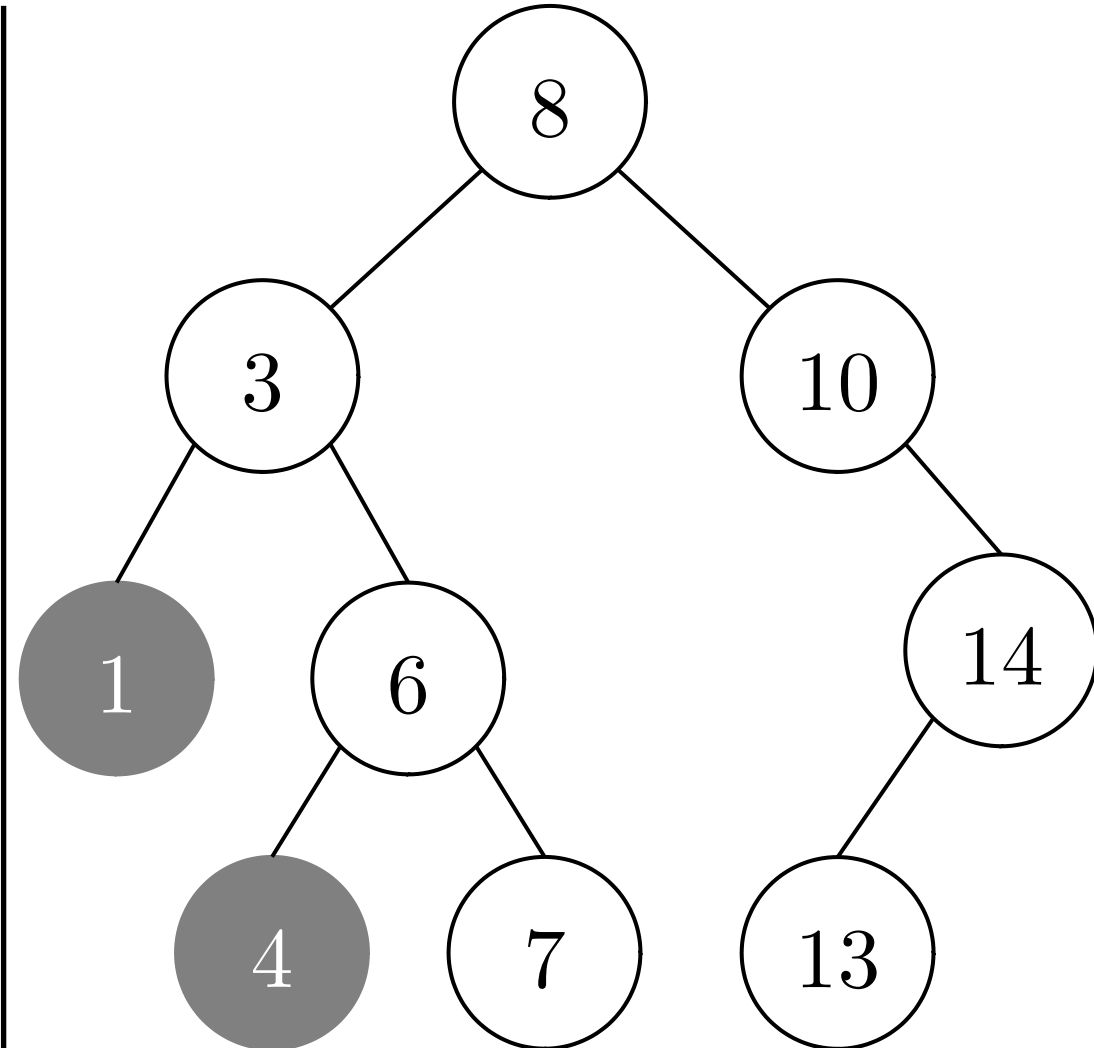
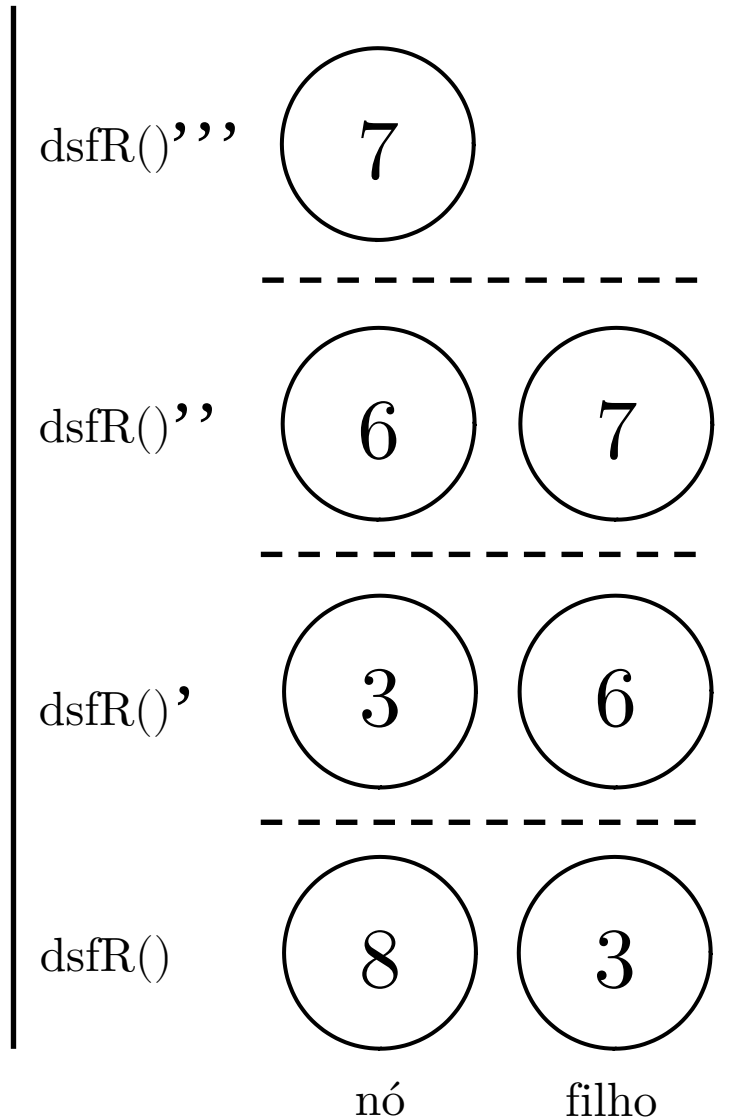
```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

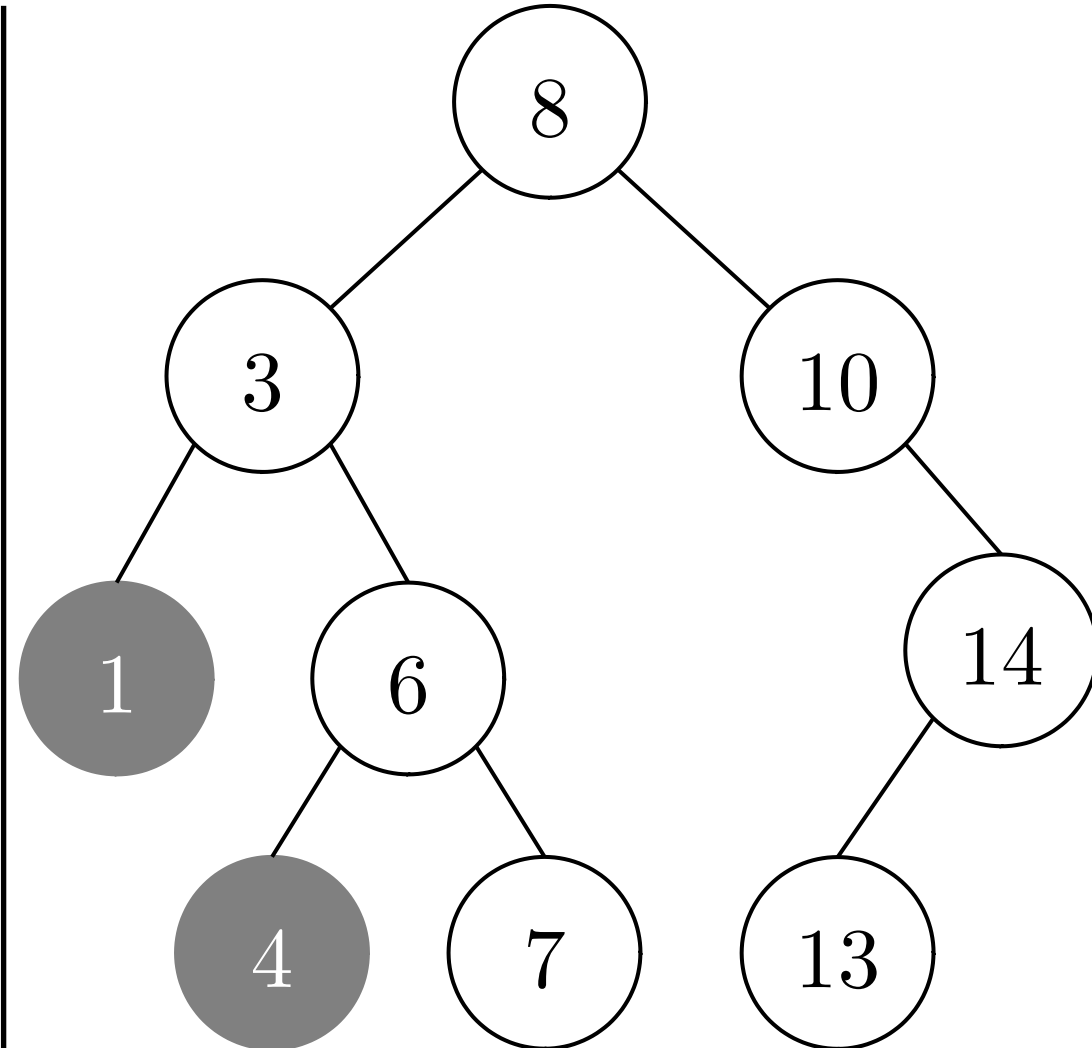
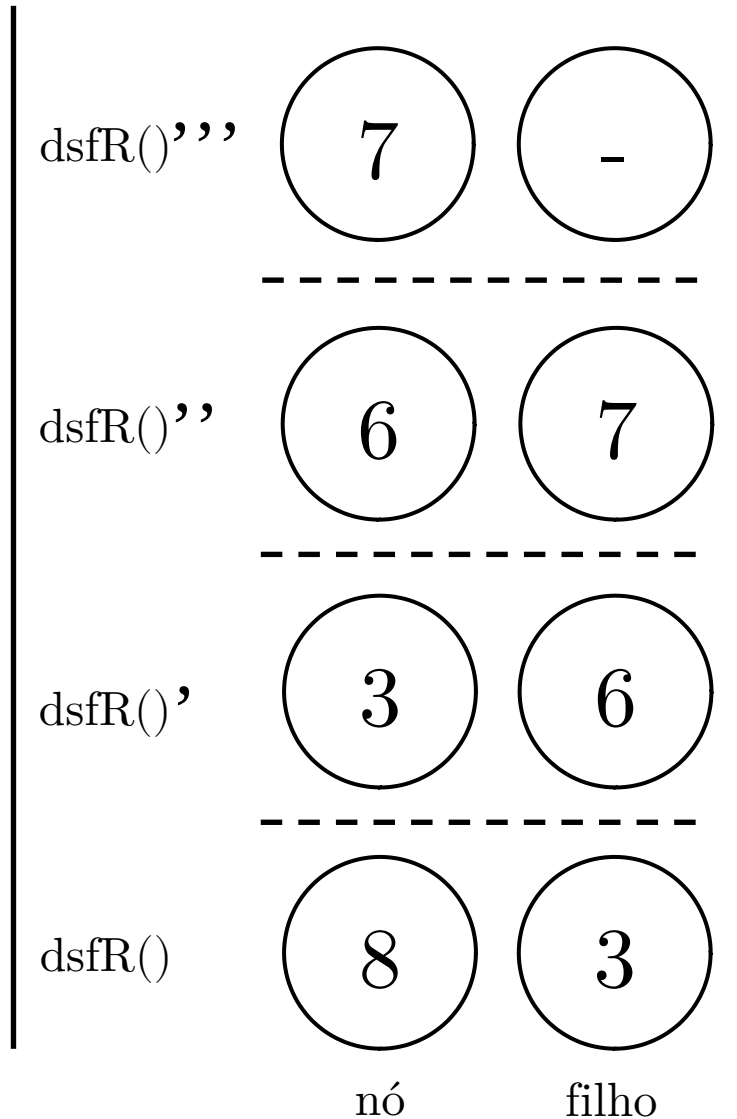
```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

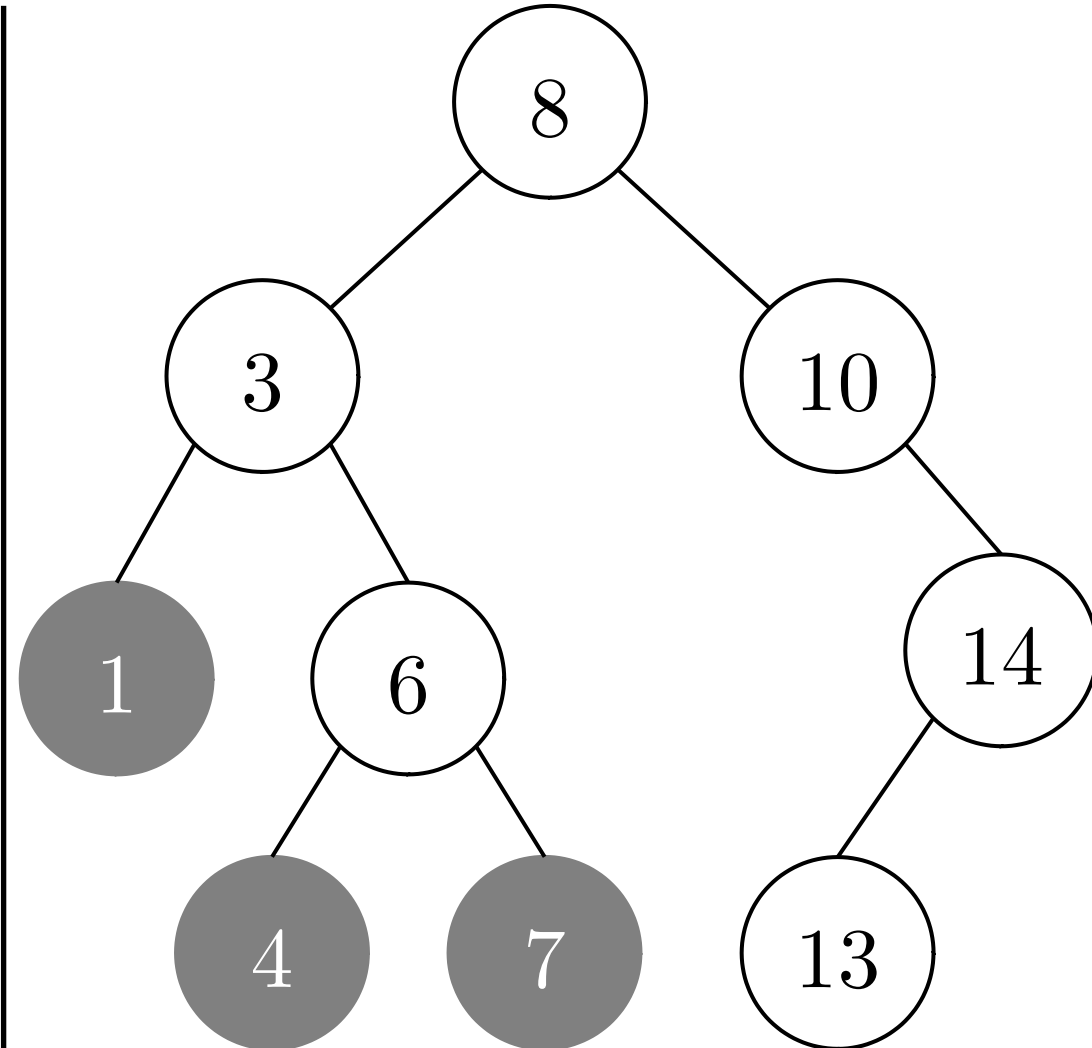
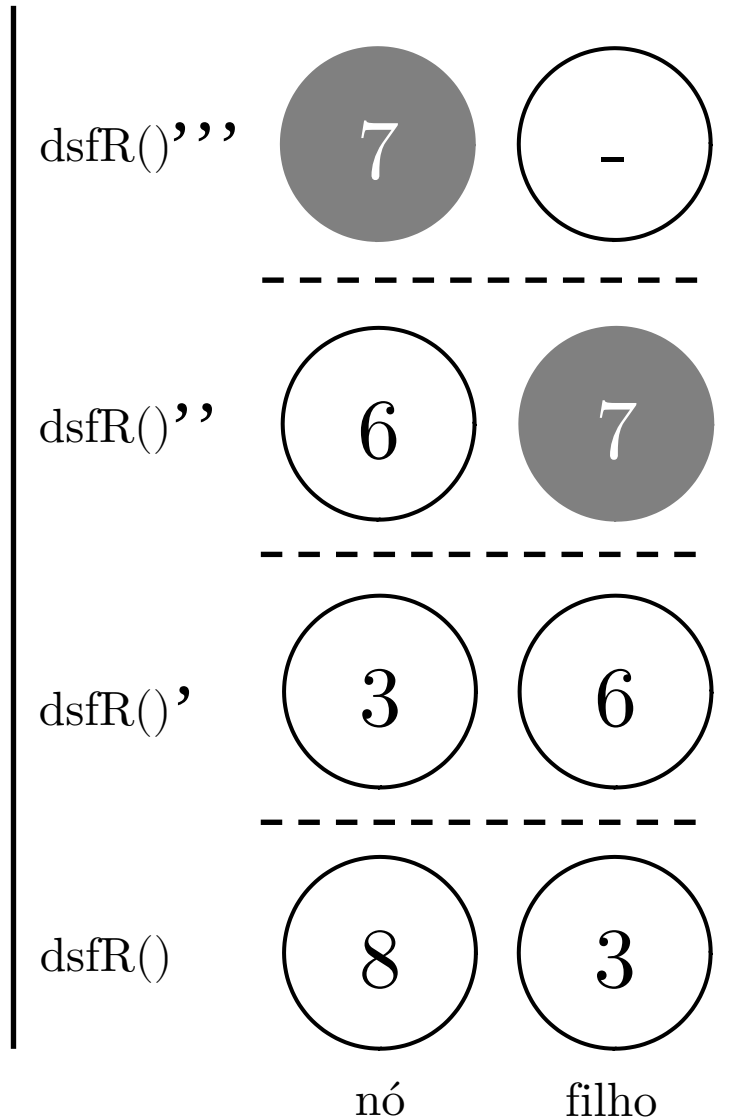
```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

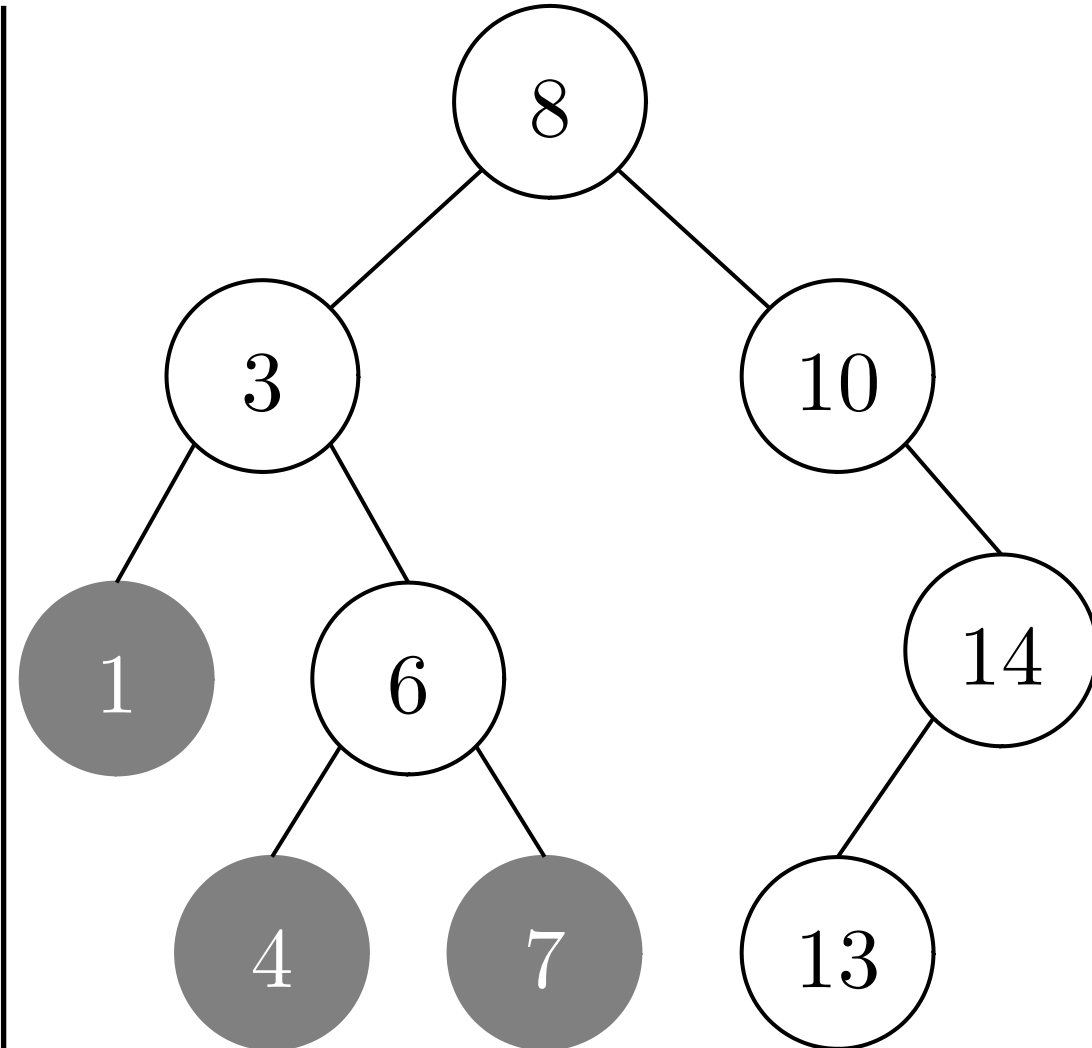
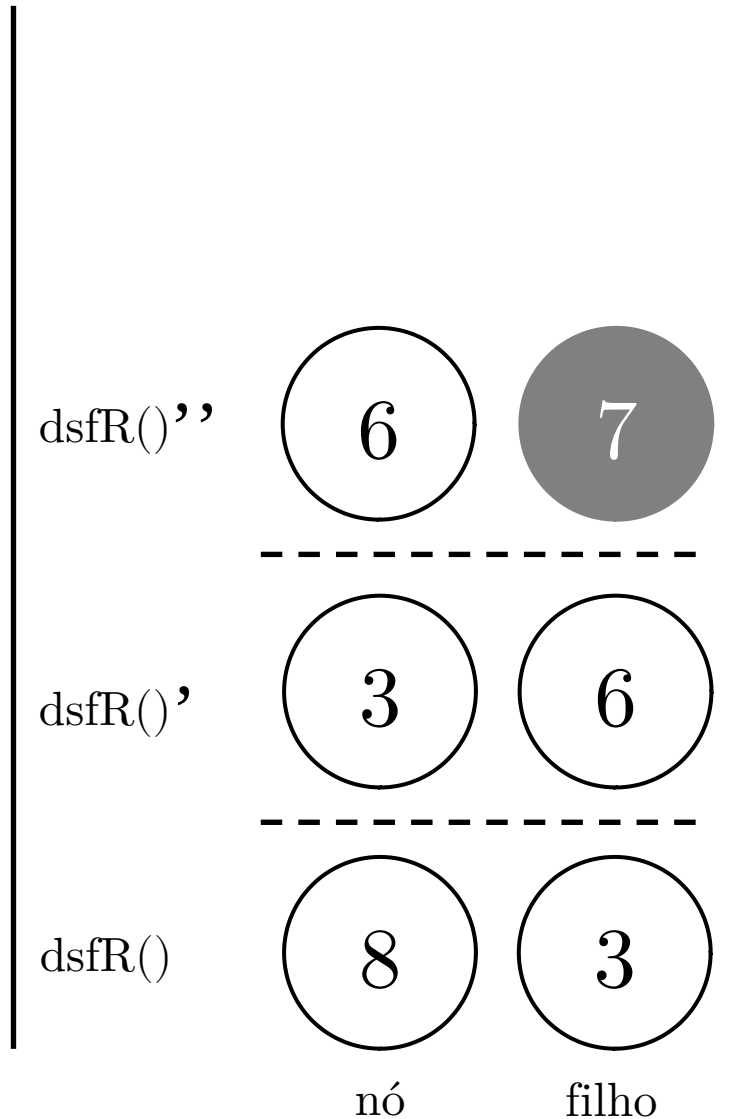
```
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

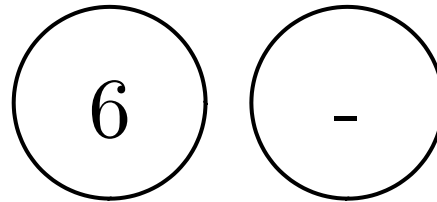
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

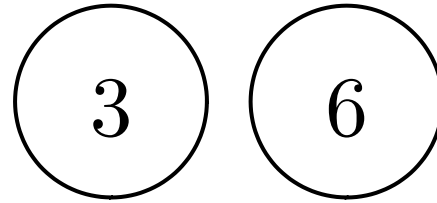
```
            dfsR(filho)
```

```
    nó.visitado = True
```

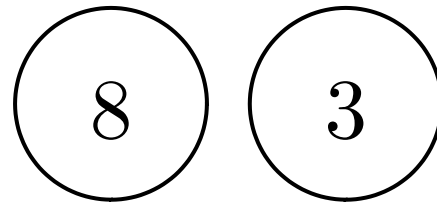
dfsR()''



dfsR()'

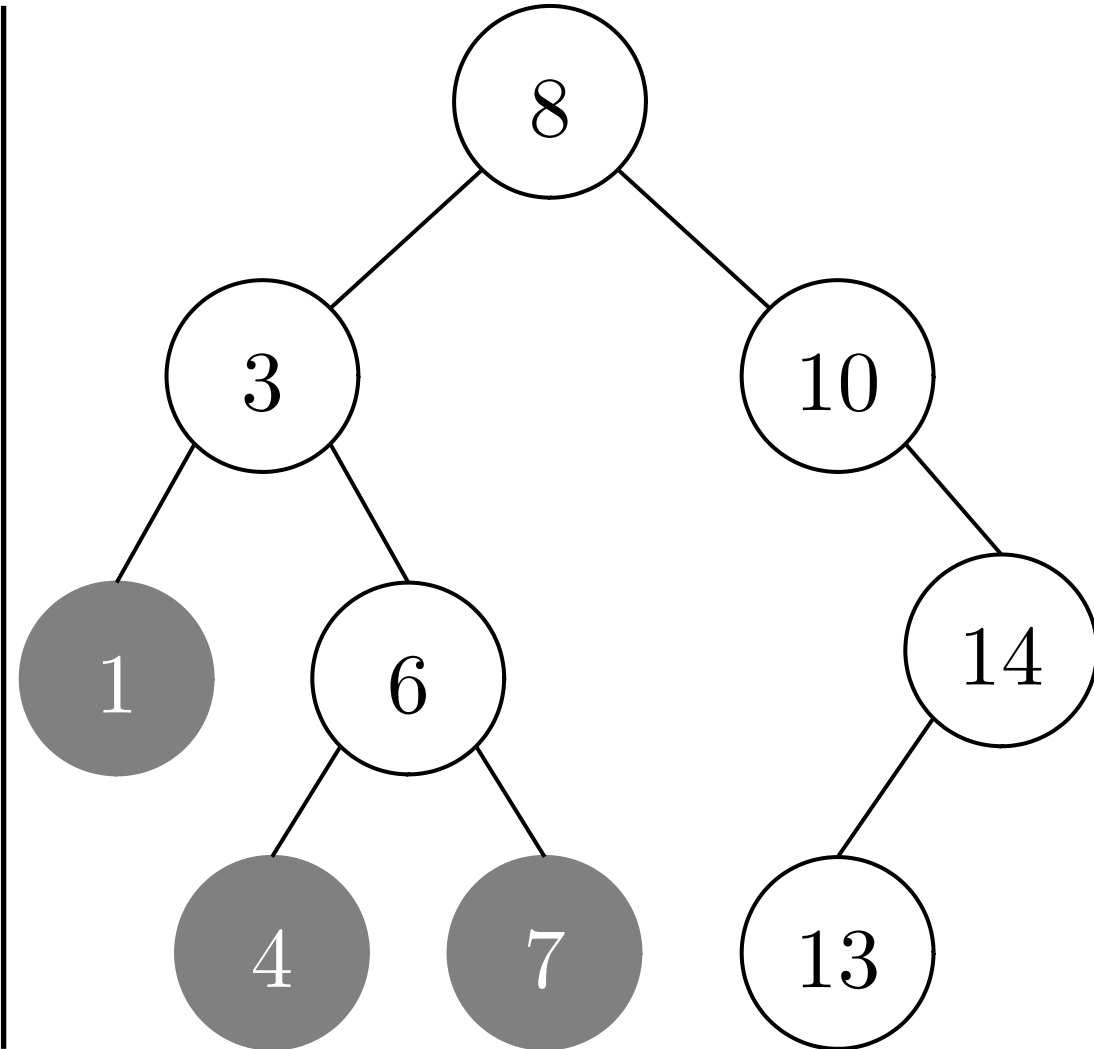


dfsR()



nó

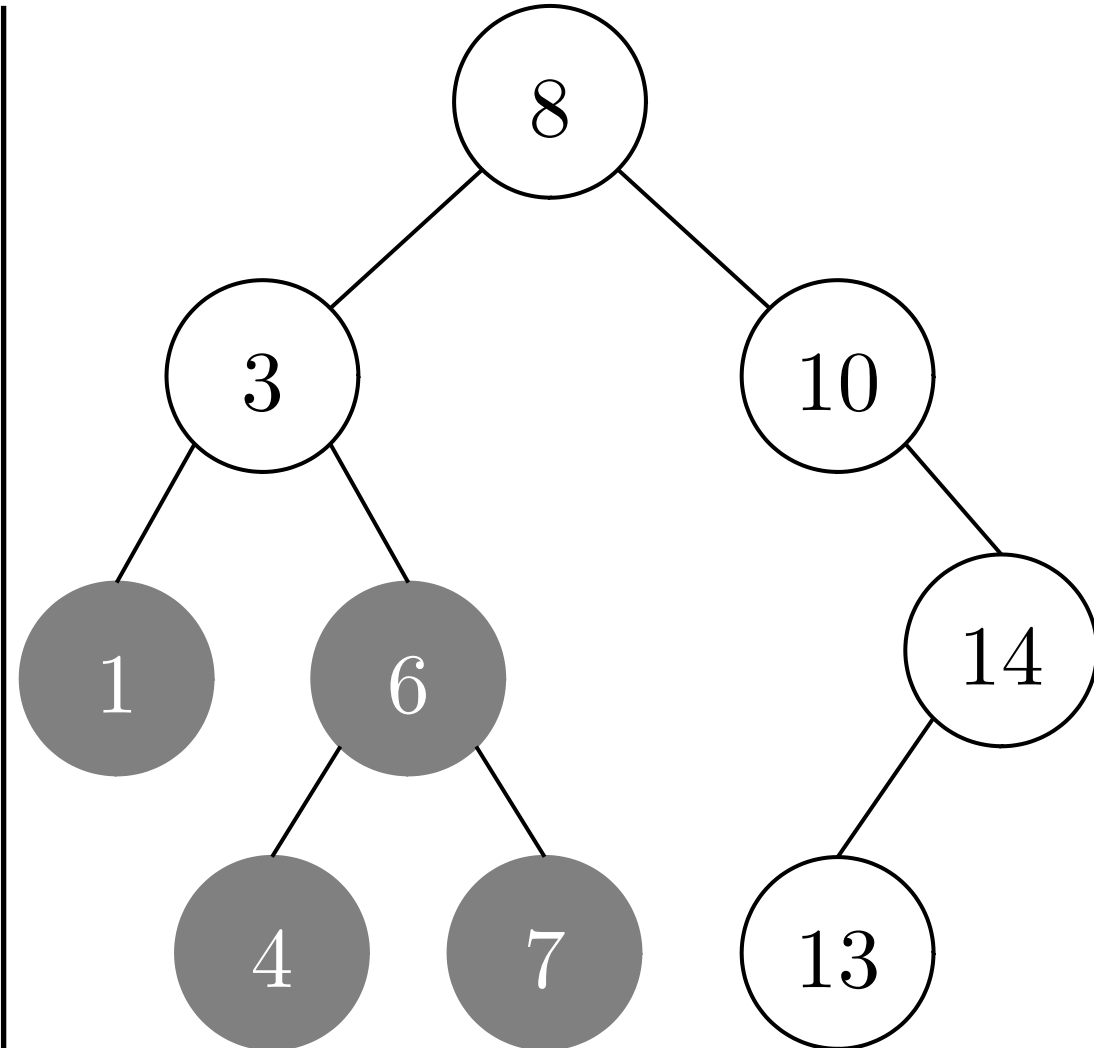
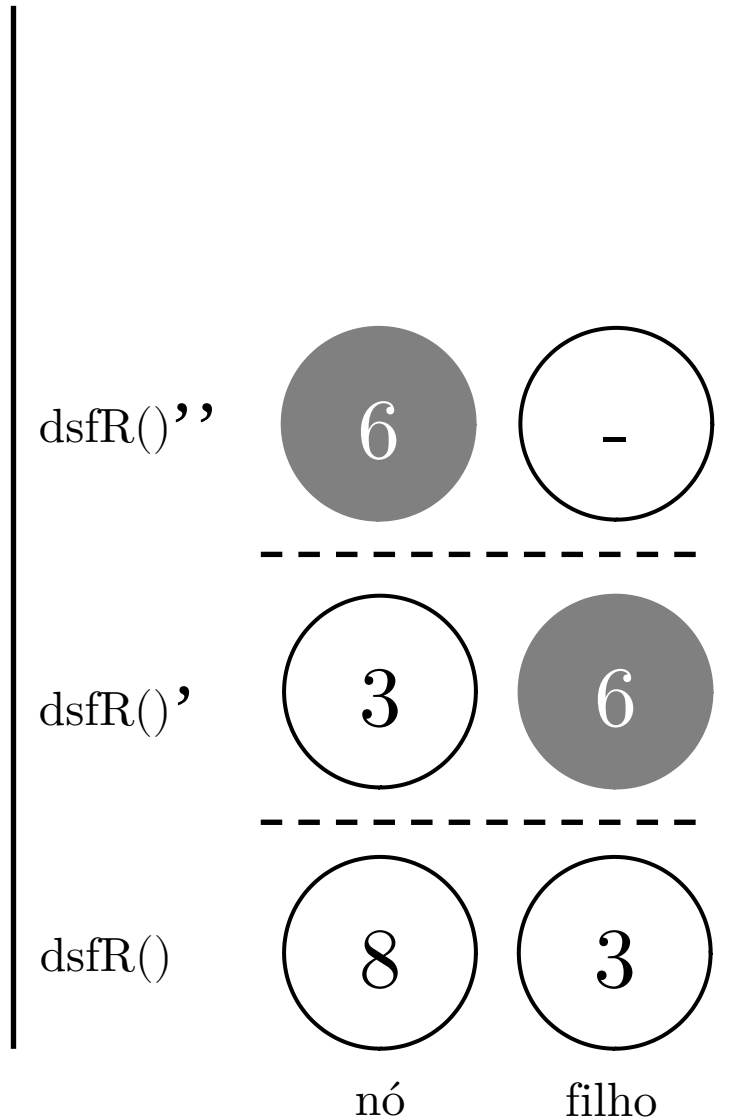
filho



busca em profundidade

RECURSIVO

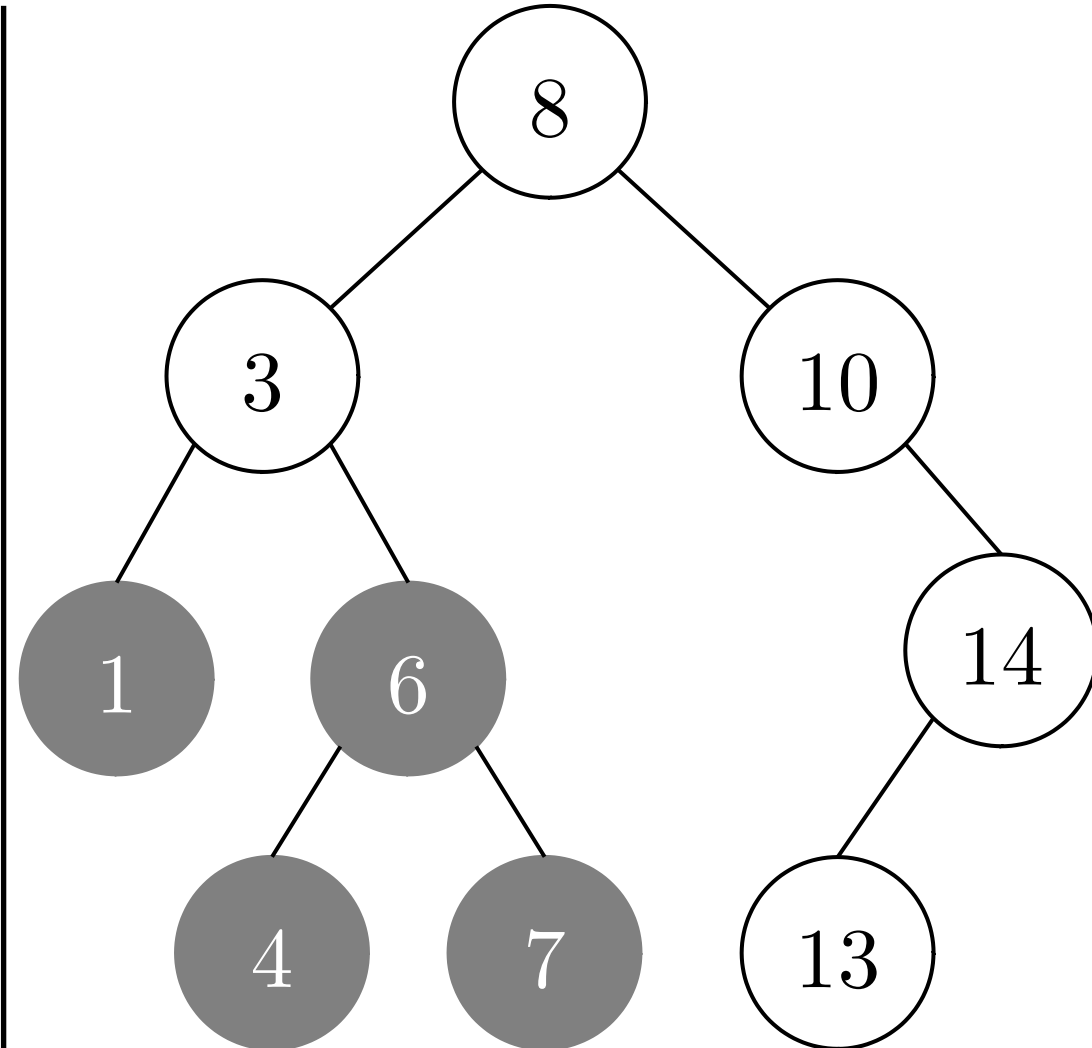
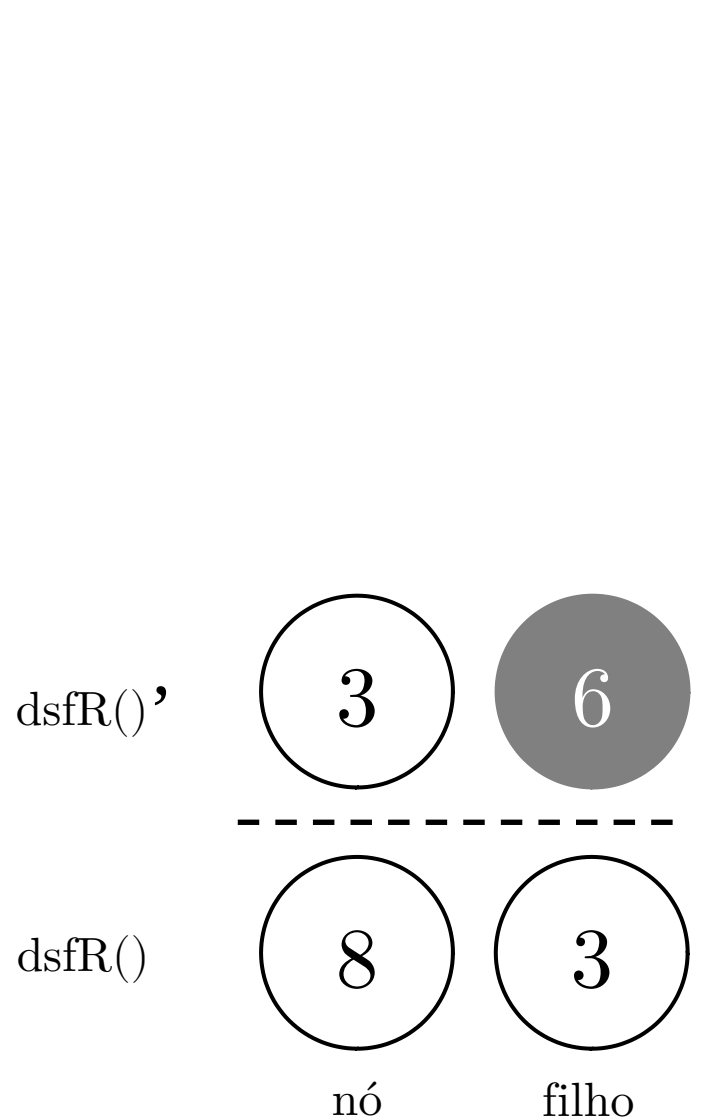
```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

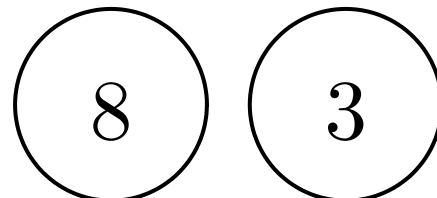
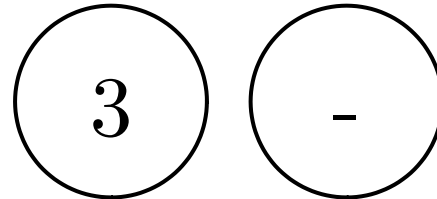
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

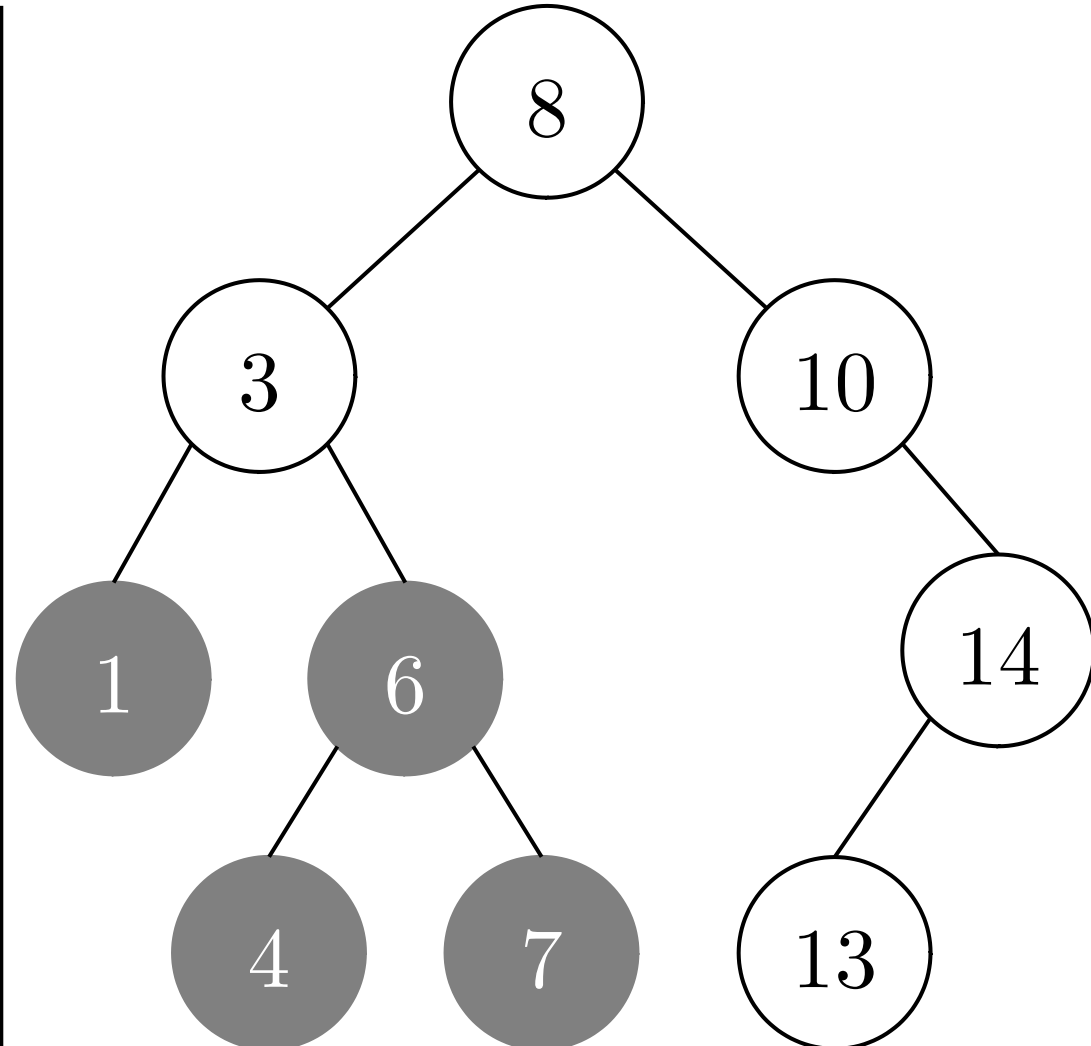
dfsR()'

dfsR()



nó

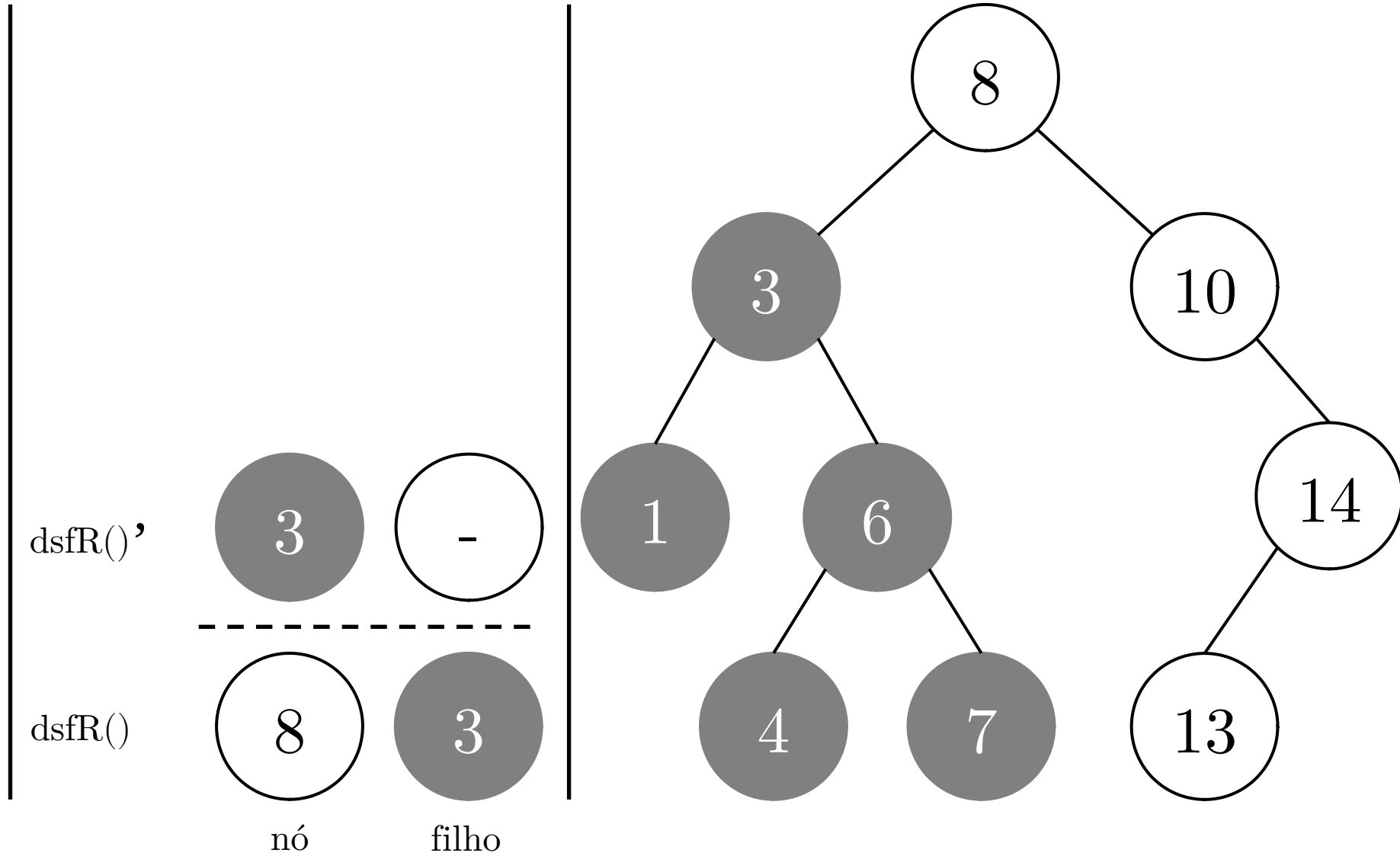
filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    → nó.visitado = True
```

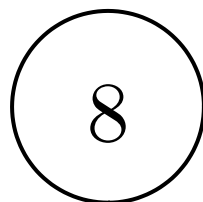


busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

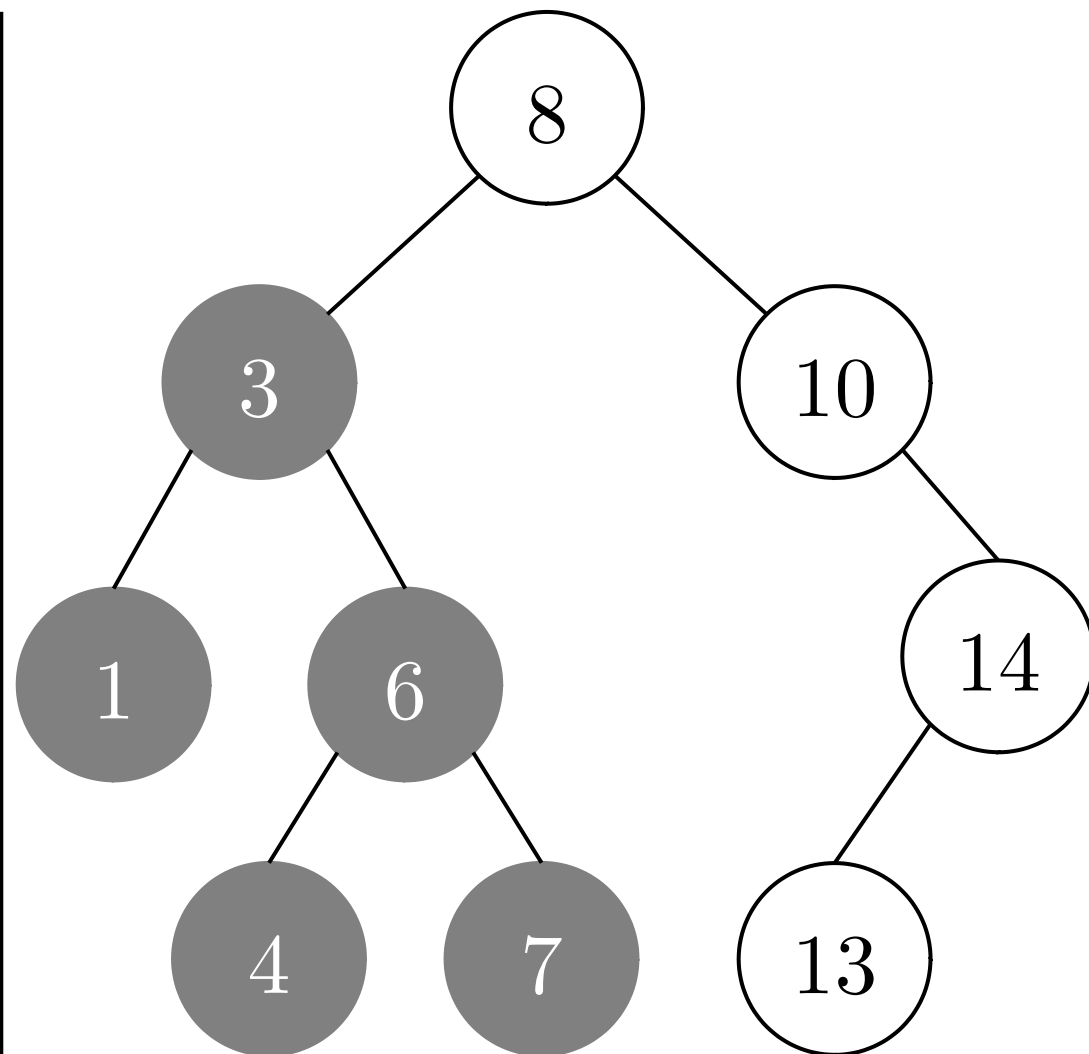
dfsR()



nó



filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

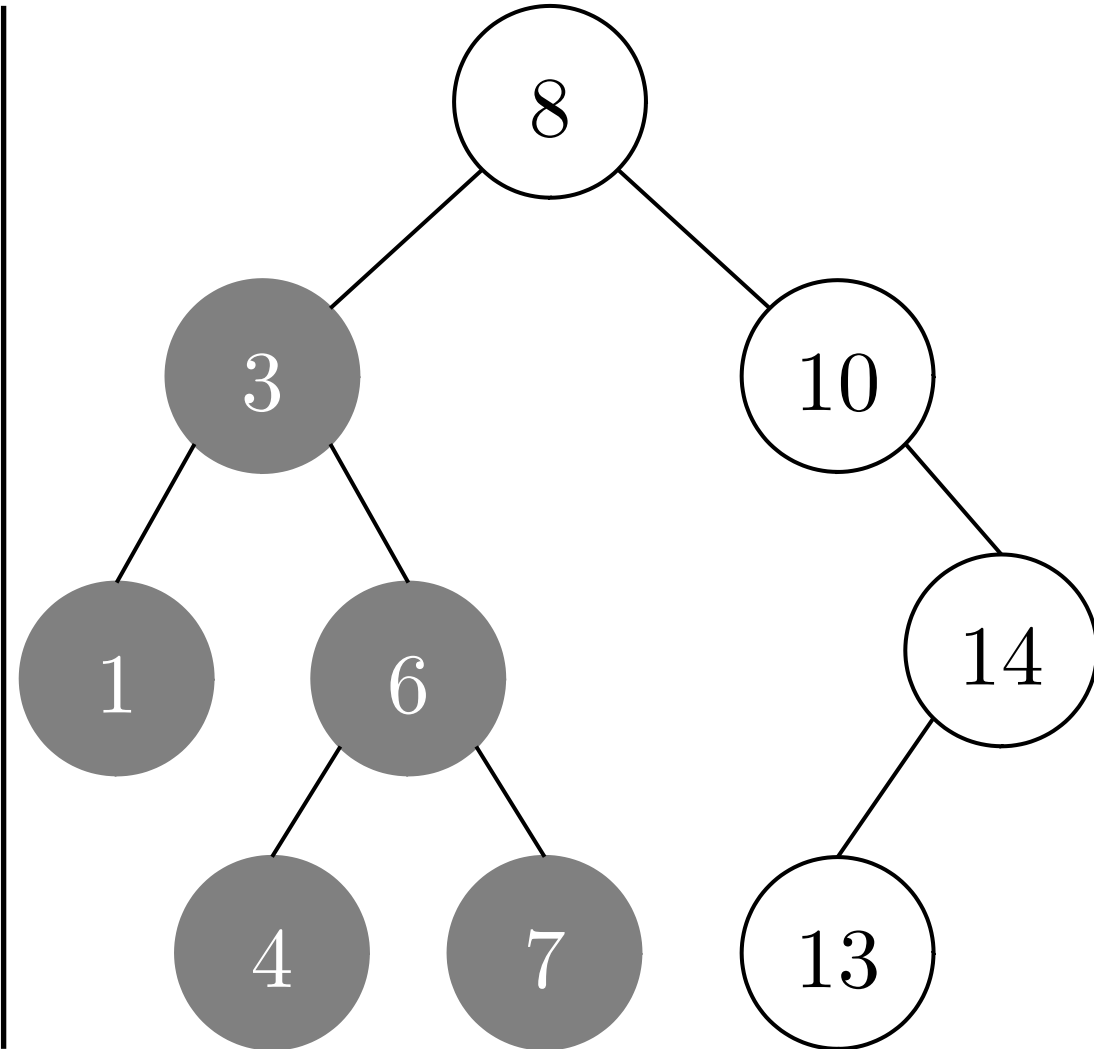
dfsR()

8

nó

10

filho

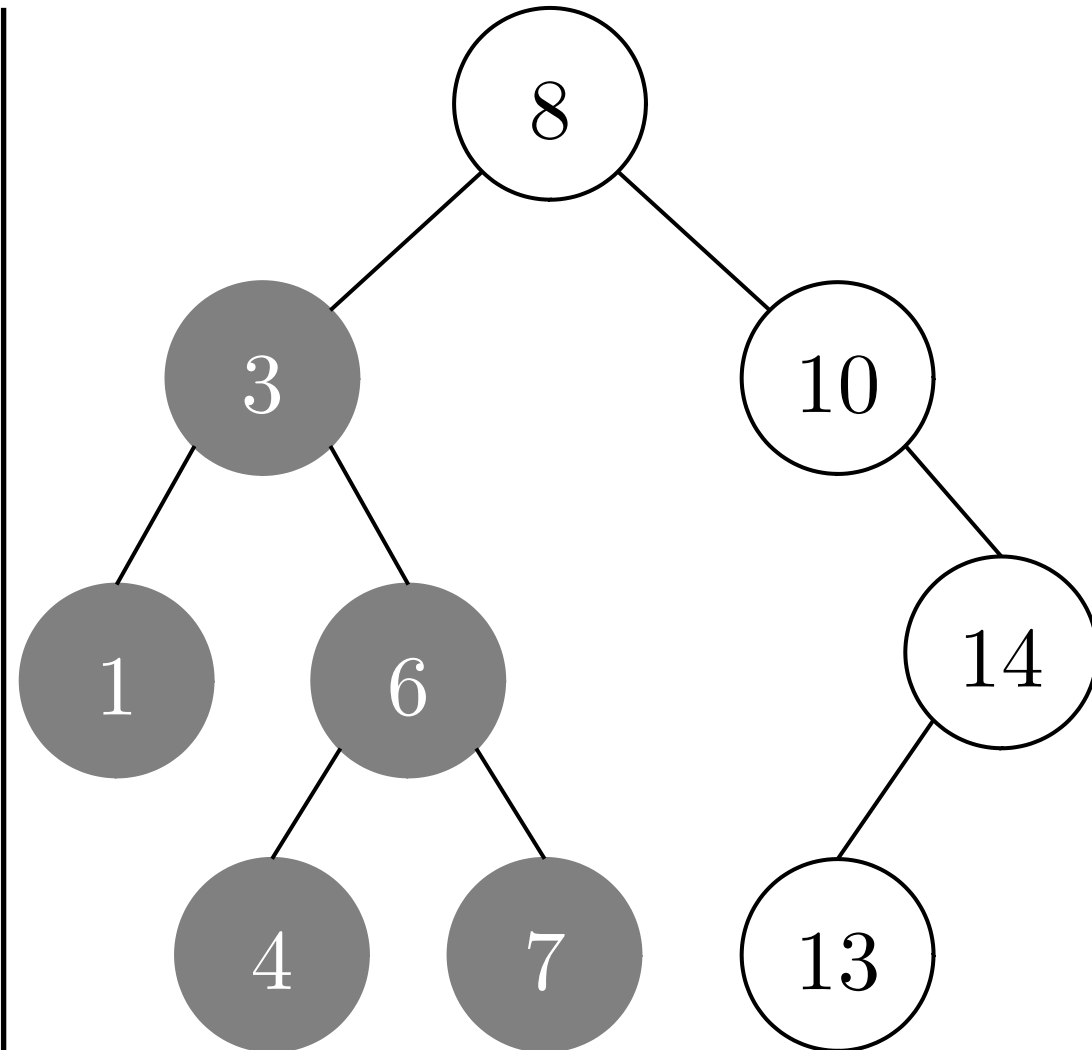
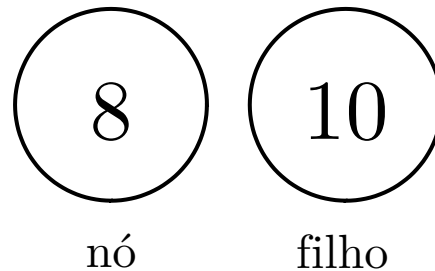


busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

dfsR()



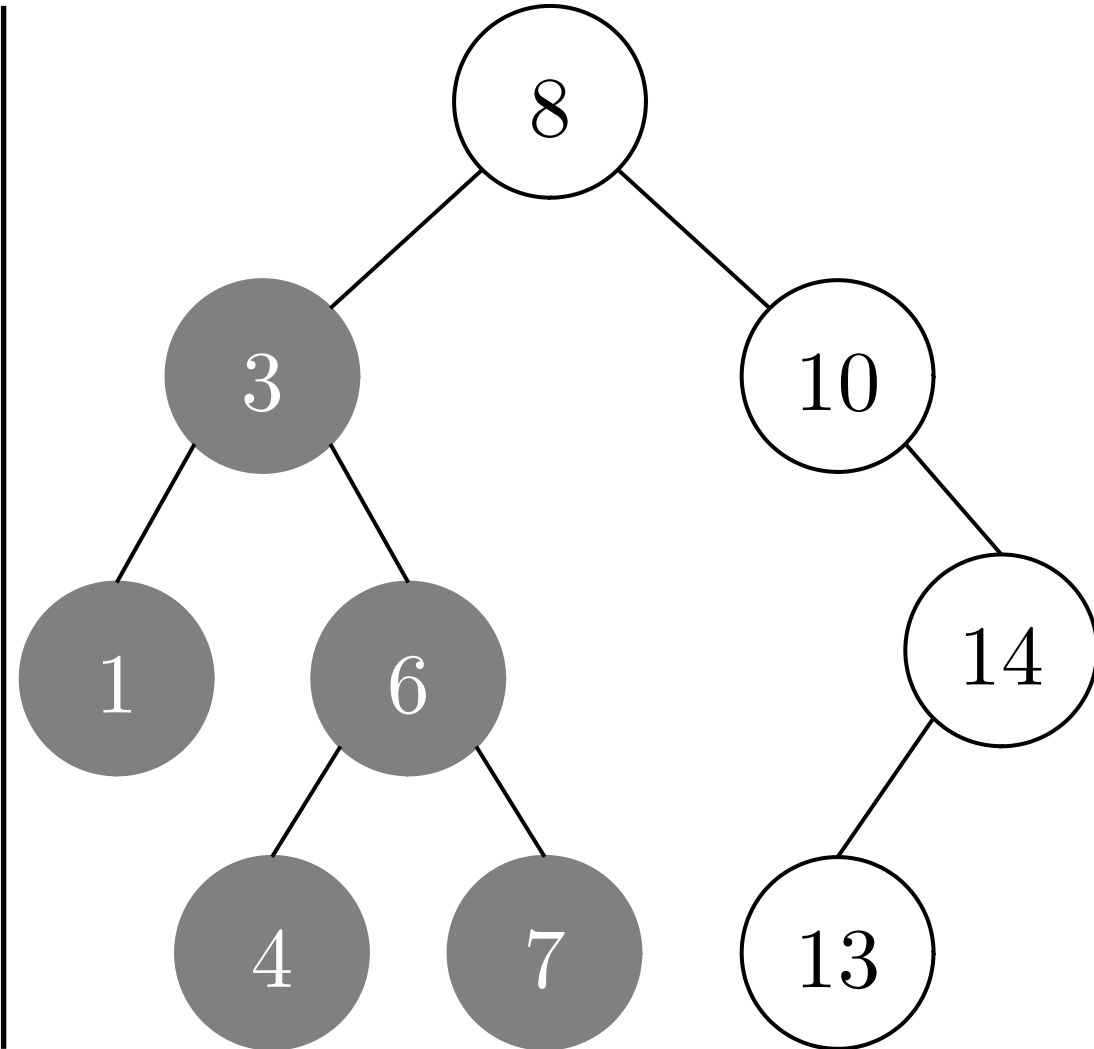
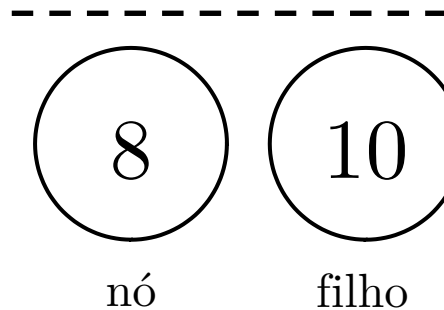
busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

dfsR()'

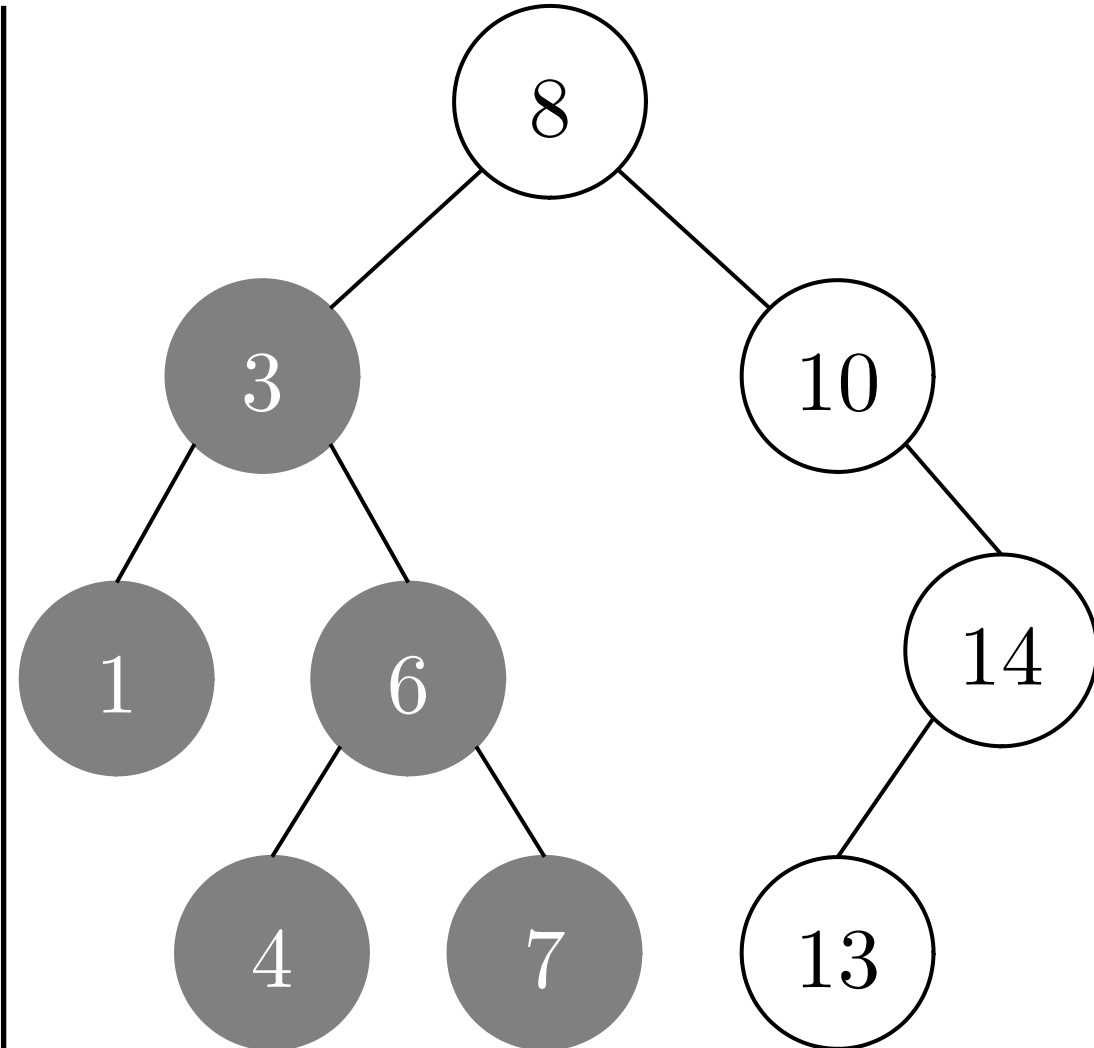
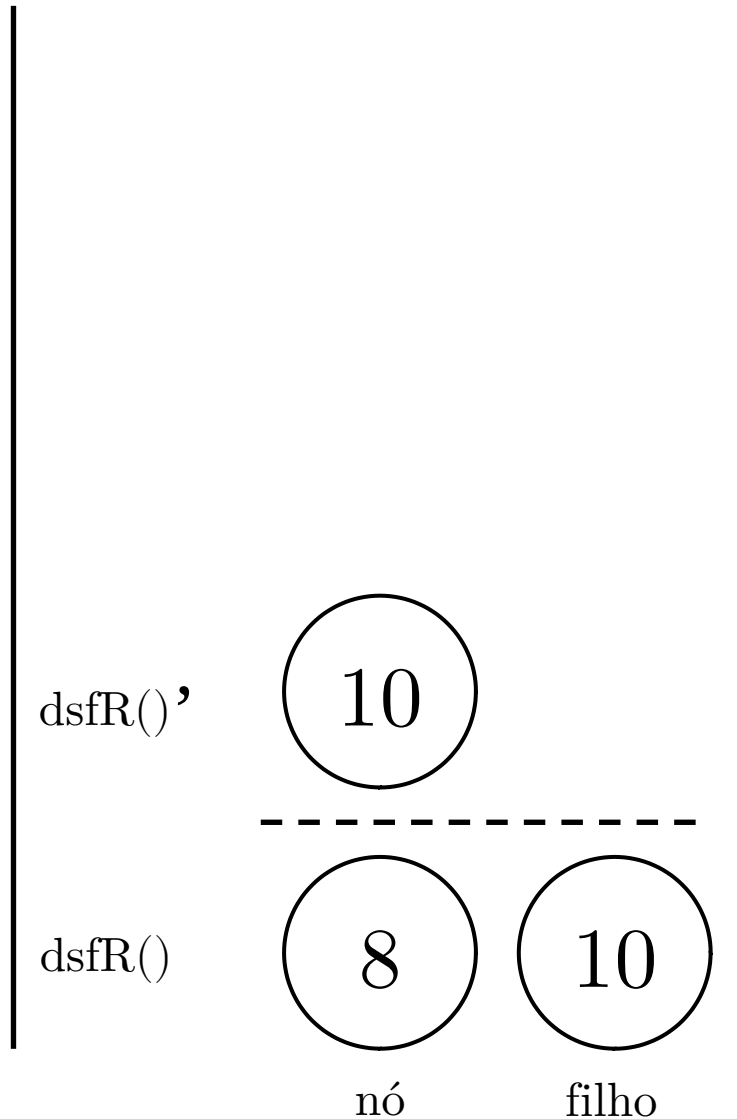
dfsR()



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

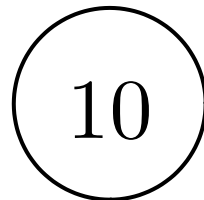
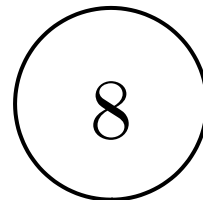
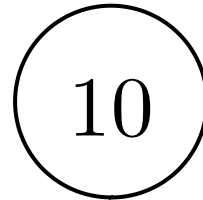
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

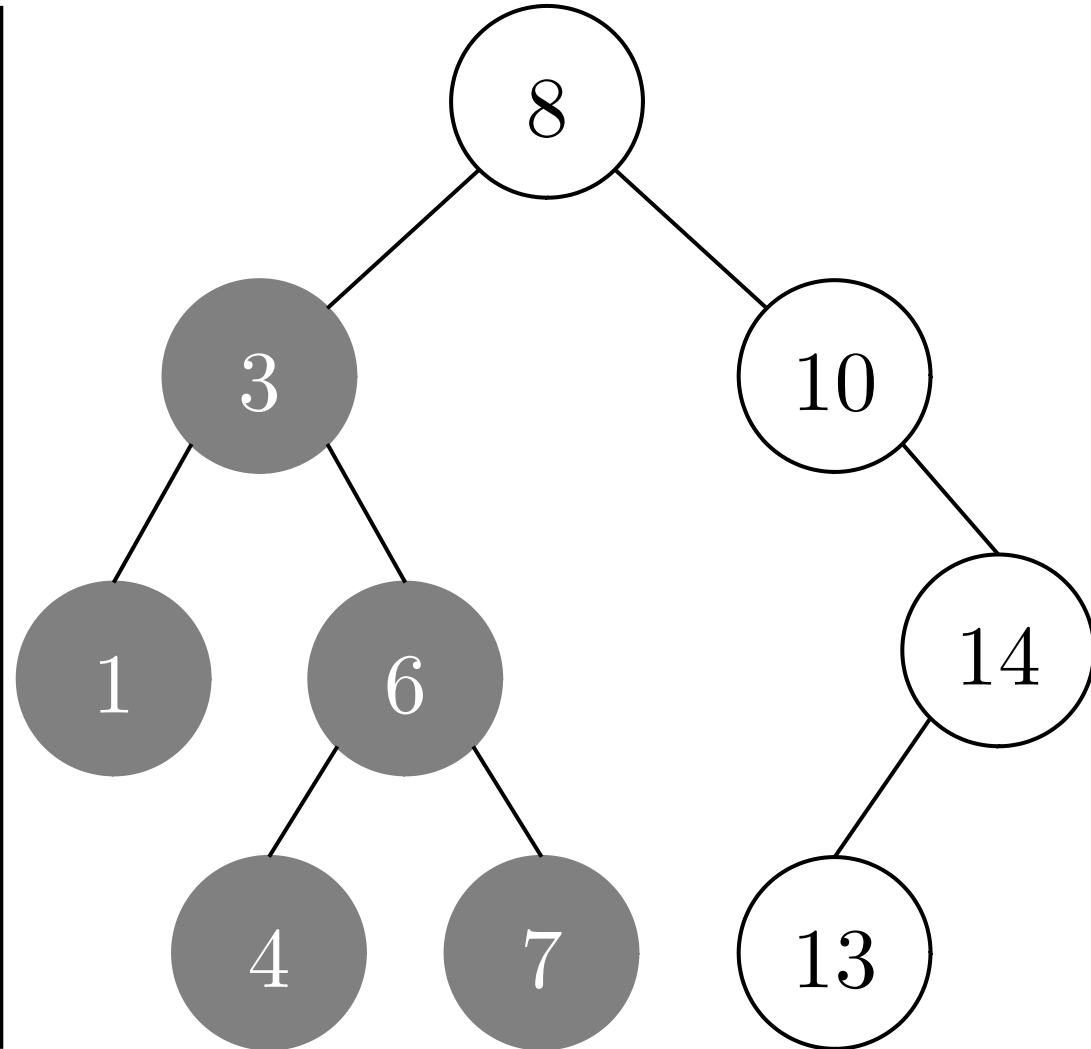
dfsR()'

dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

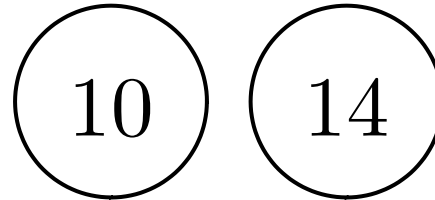
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

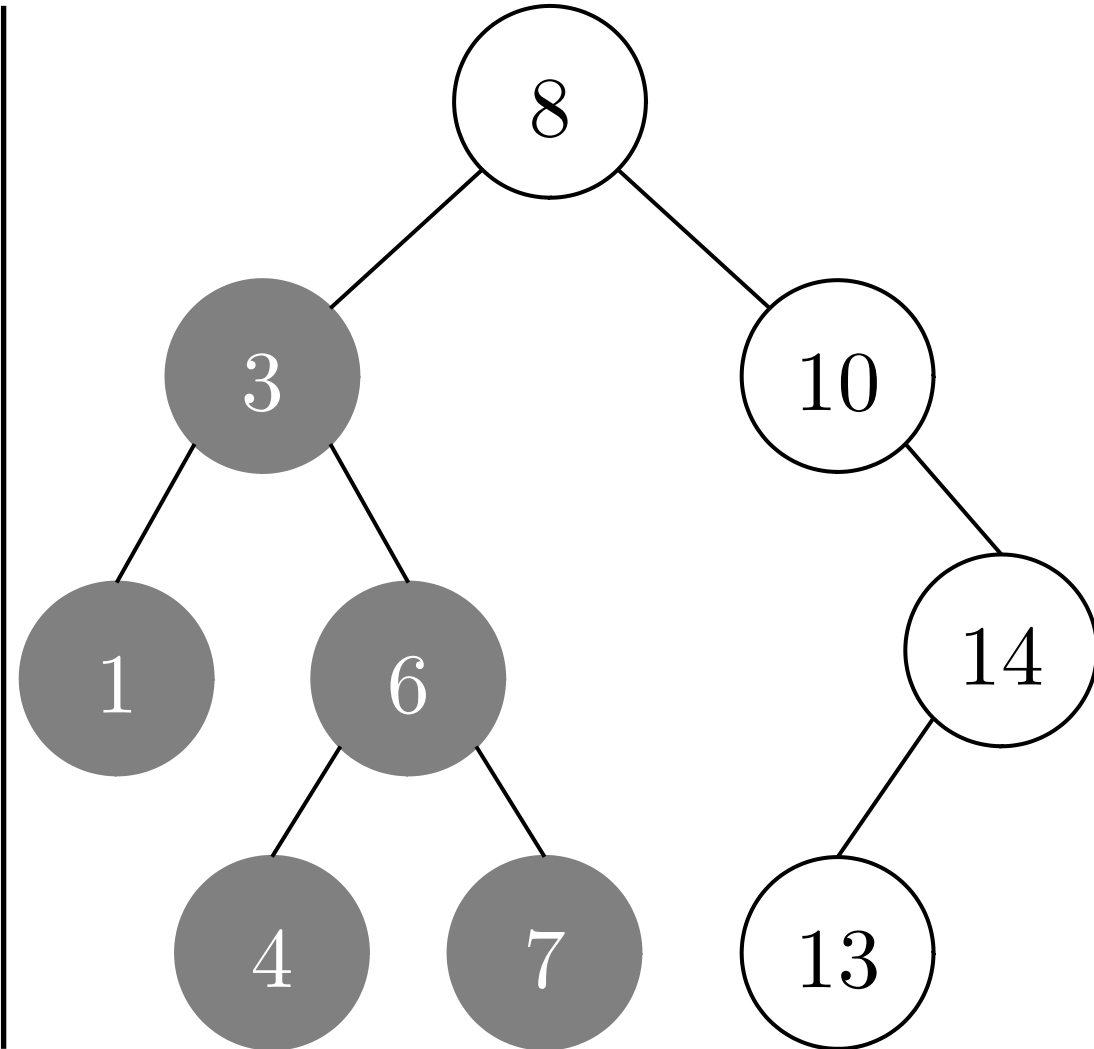
dfsR()'

dfsR()



nó

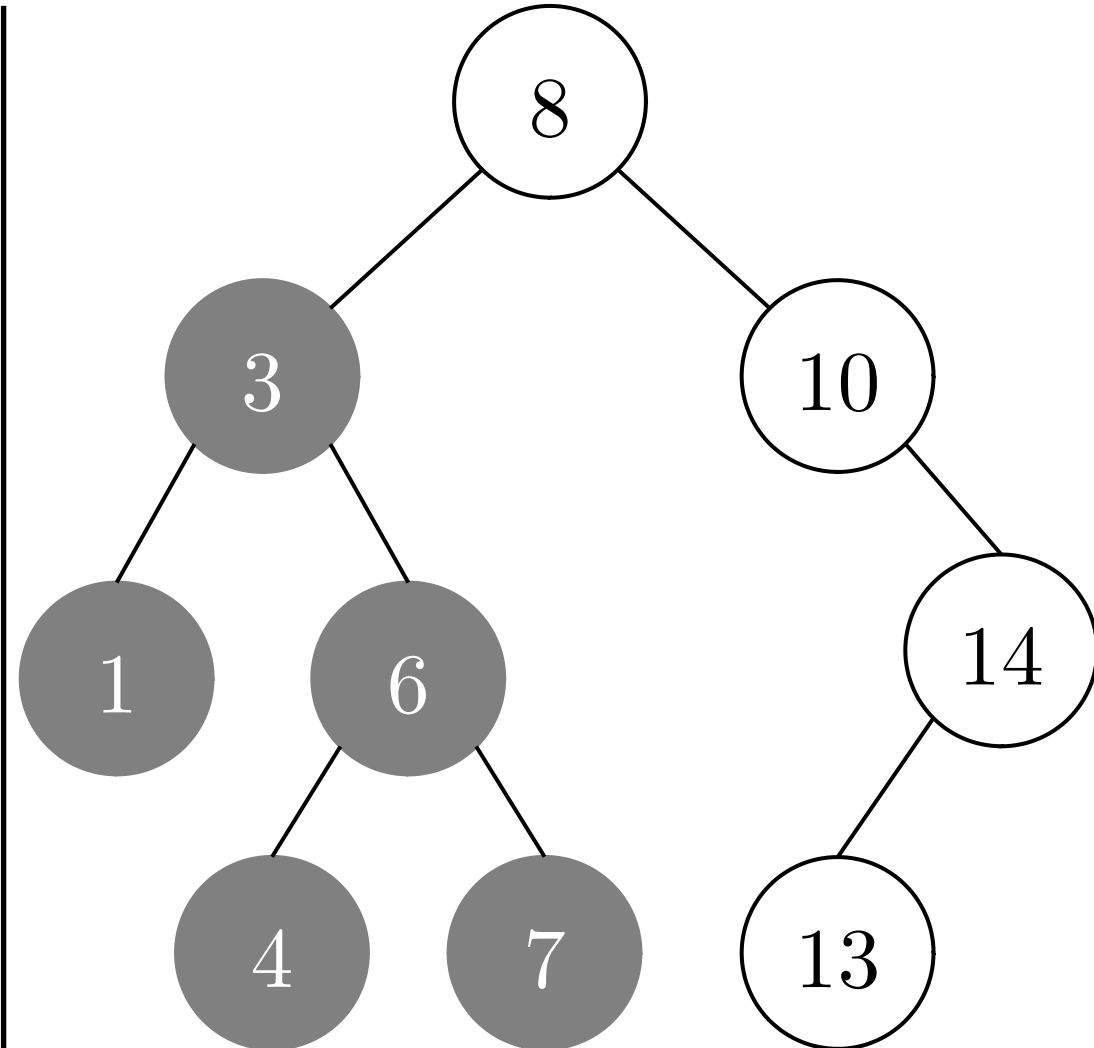
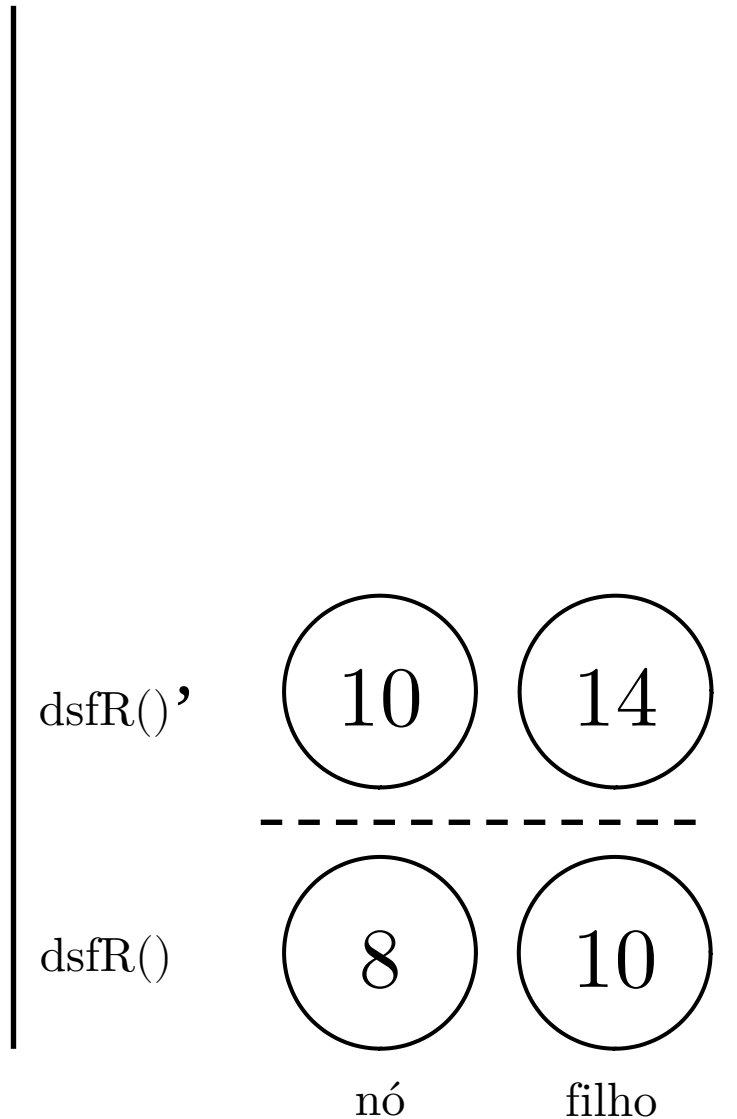
filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

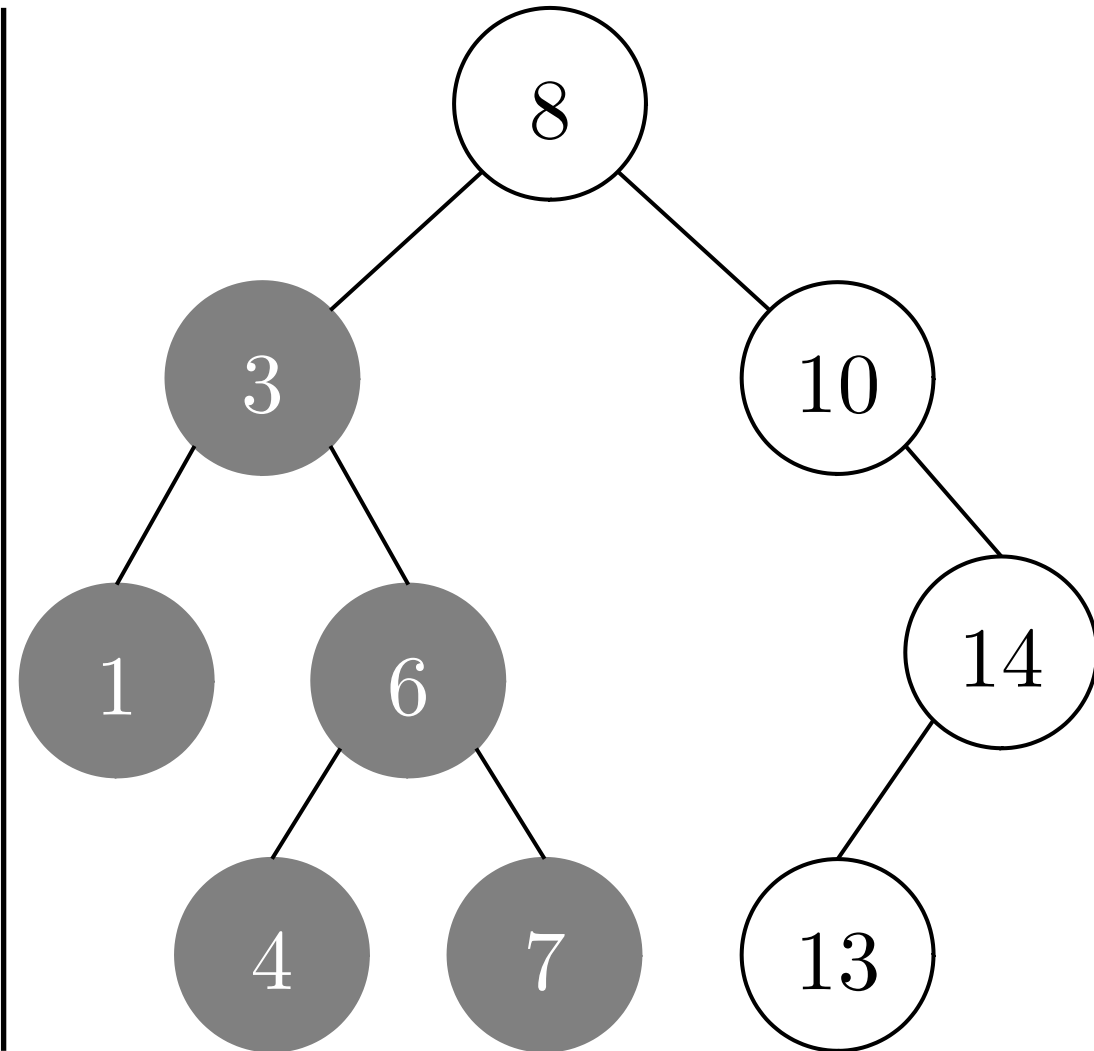
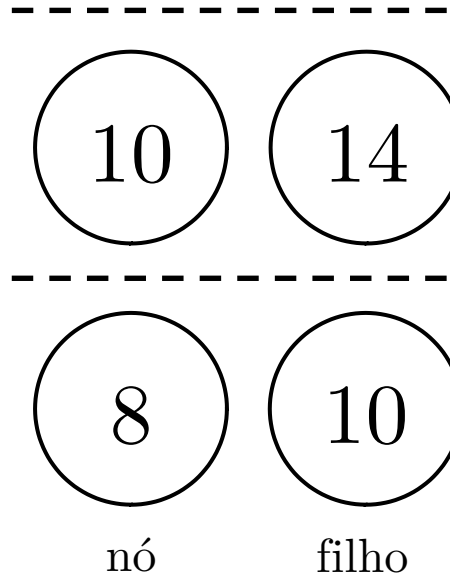
RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```

dfsR()''

dfsR()'

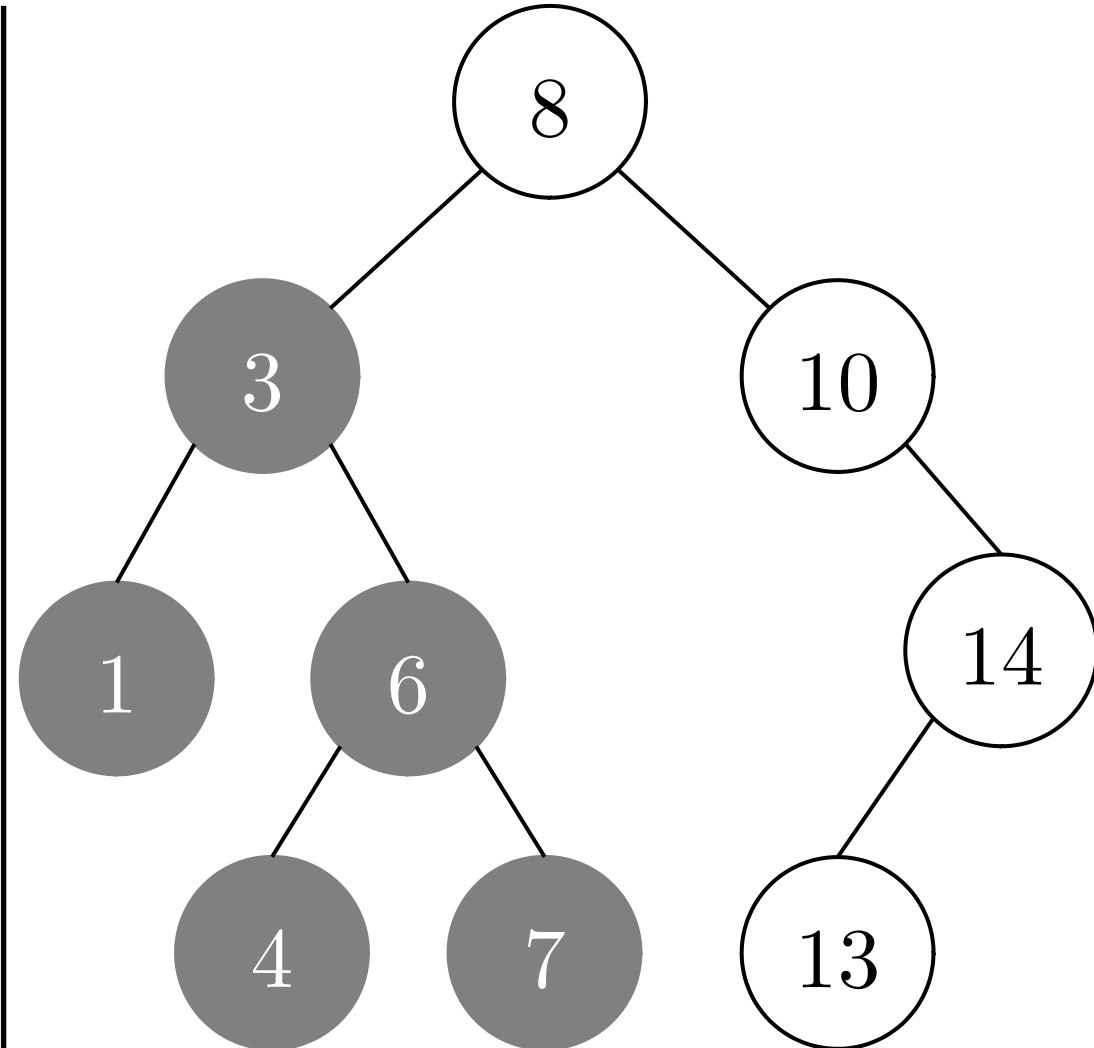
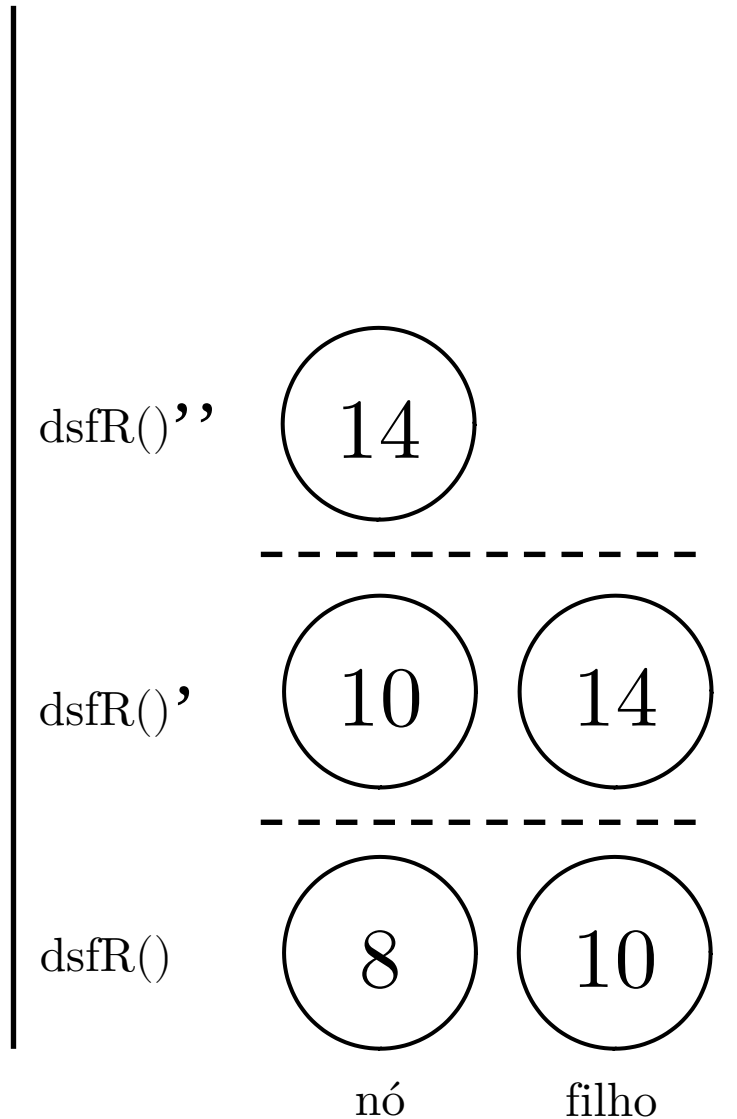
dfsR()



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

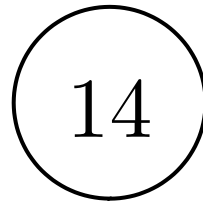
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

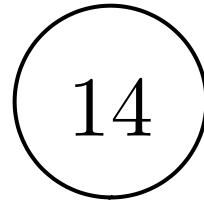
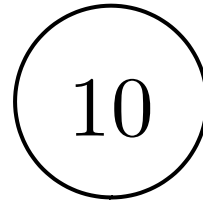
```
            dfsR(filho)
```

```
    nó.visitado = True
```

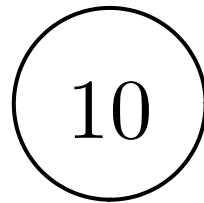
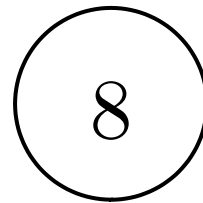
dfsR()''



dfsR()'

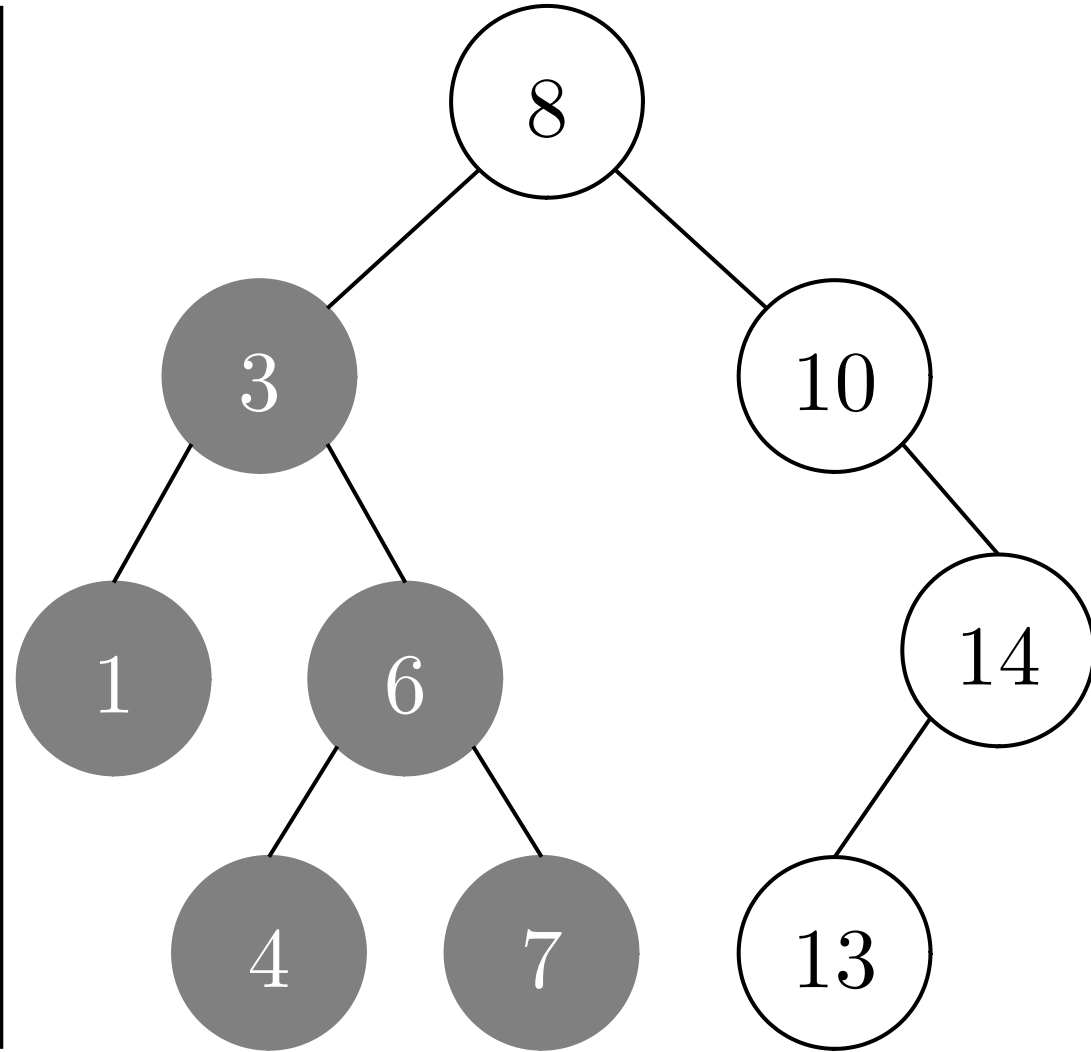


dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

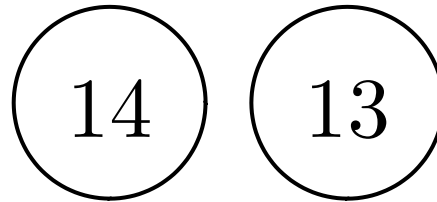
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

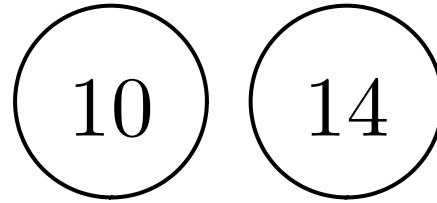
```
            dfsR(filho)
```

```
    nó.visitado = True
```

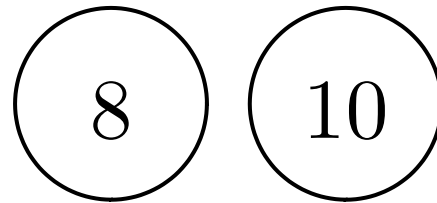
dfsR()''



dfsR()'

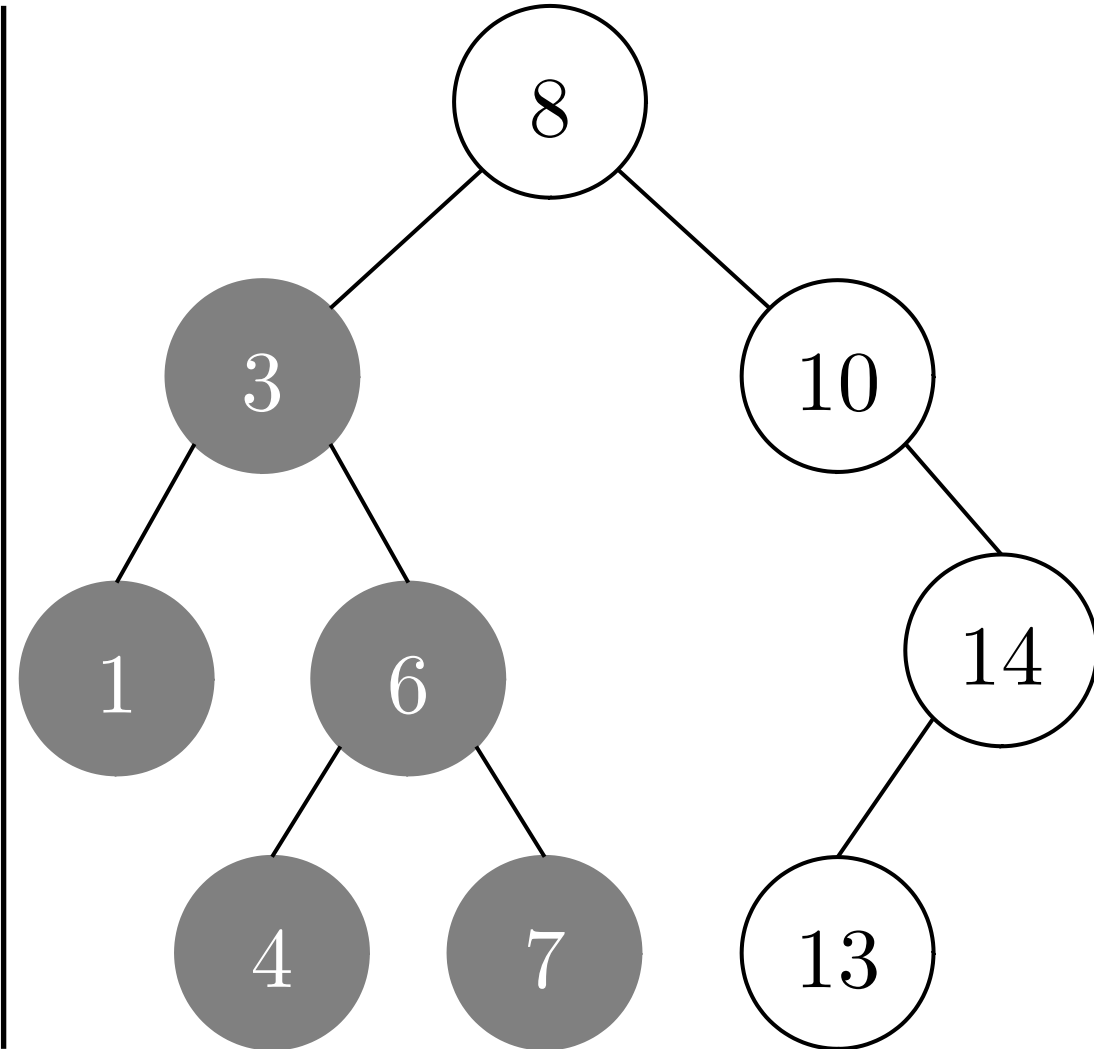


dfsR()



nó

filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

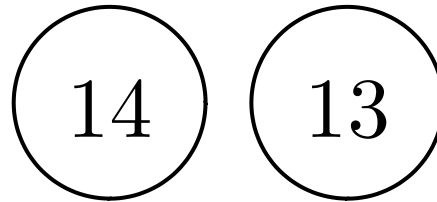
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

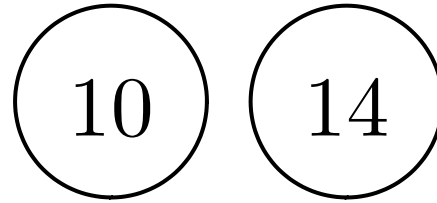
```
            dfsR(filho)
```

```
    nó.visitado = True
```

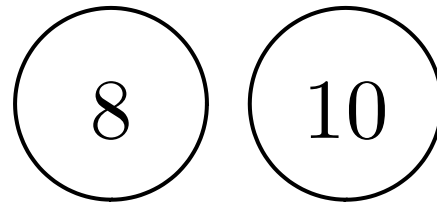
dfsR()''



dfsR()'

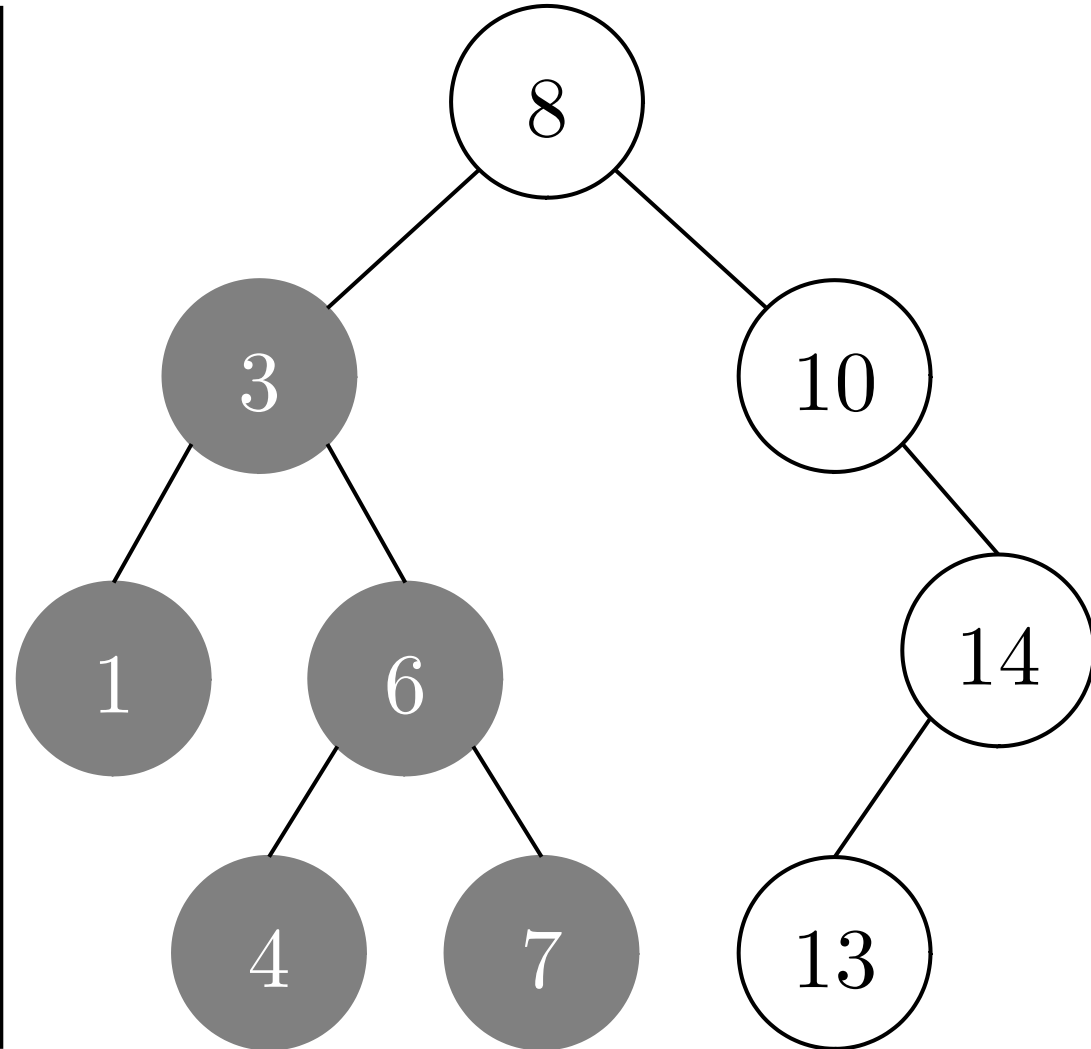


dfsR()



nó

filho



busca em profundidade

RECURSIVO

def dfsR(nó):

if (nó.visitado):

return

for filho in nó.filhos():

if (not filho.visitado):

dfsR(filho)

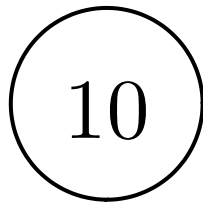
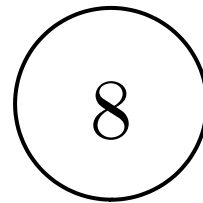
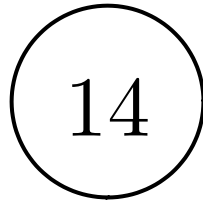
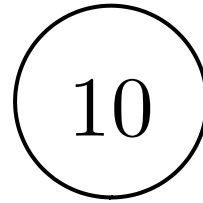
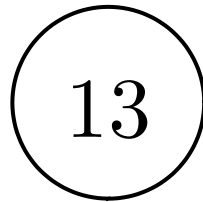
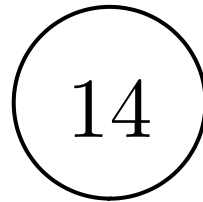
nó.visitado = True

dfsR()'''

dfsR()''

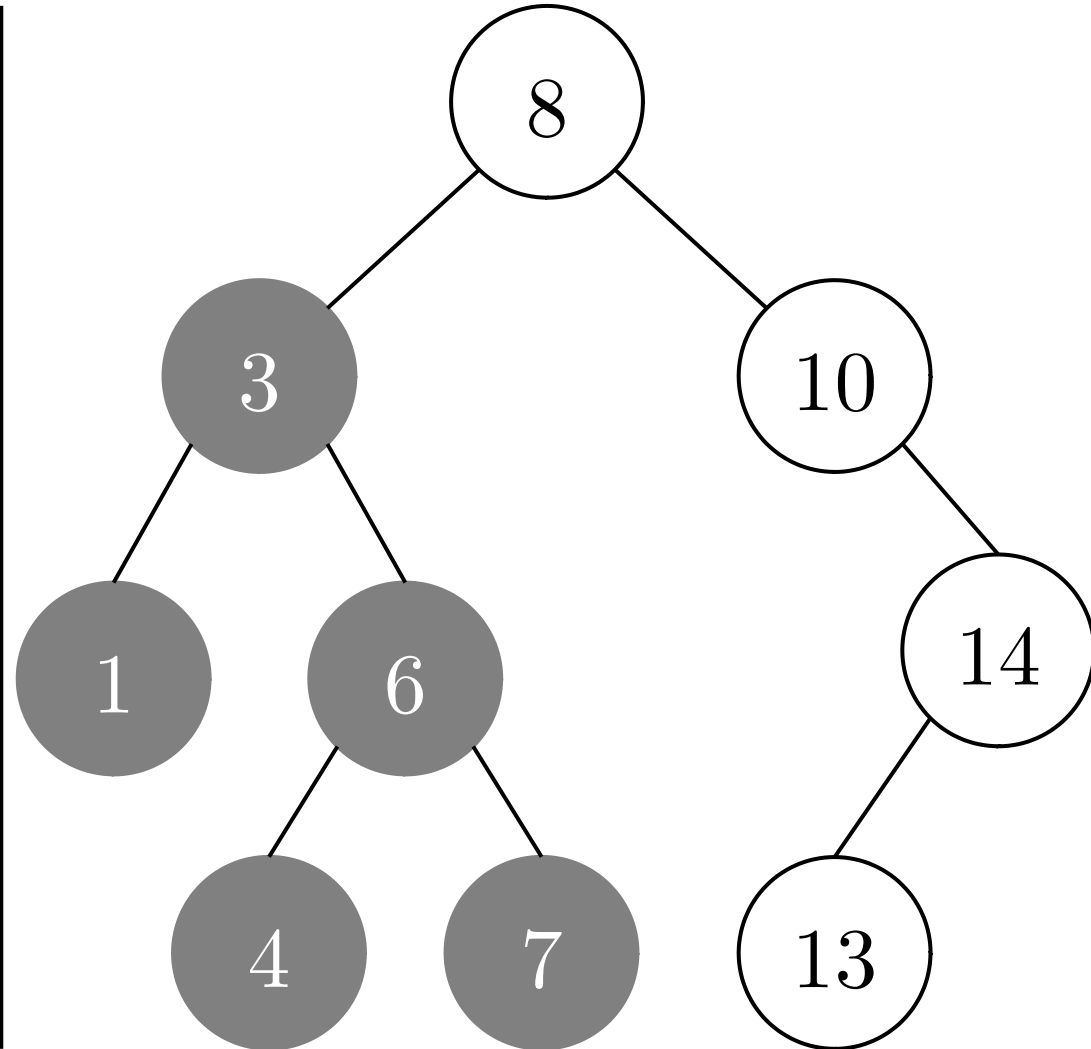
dfsR()'

dfsR()



nó

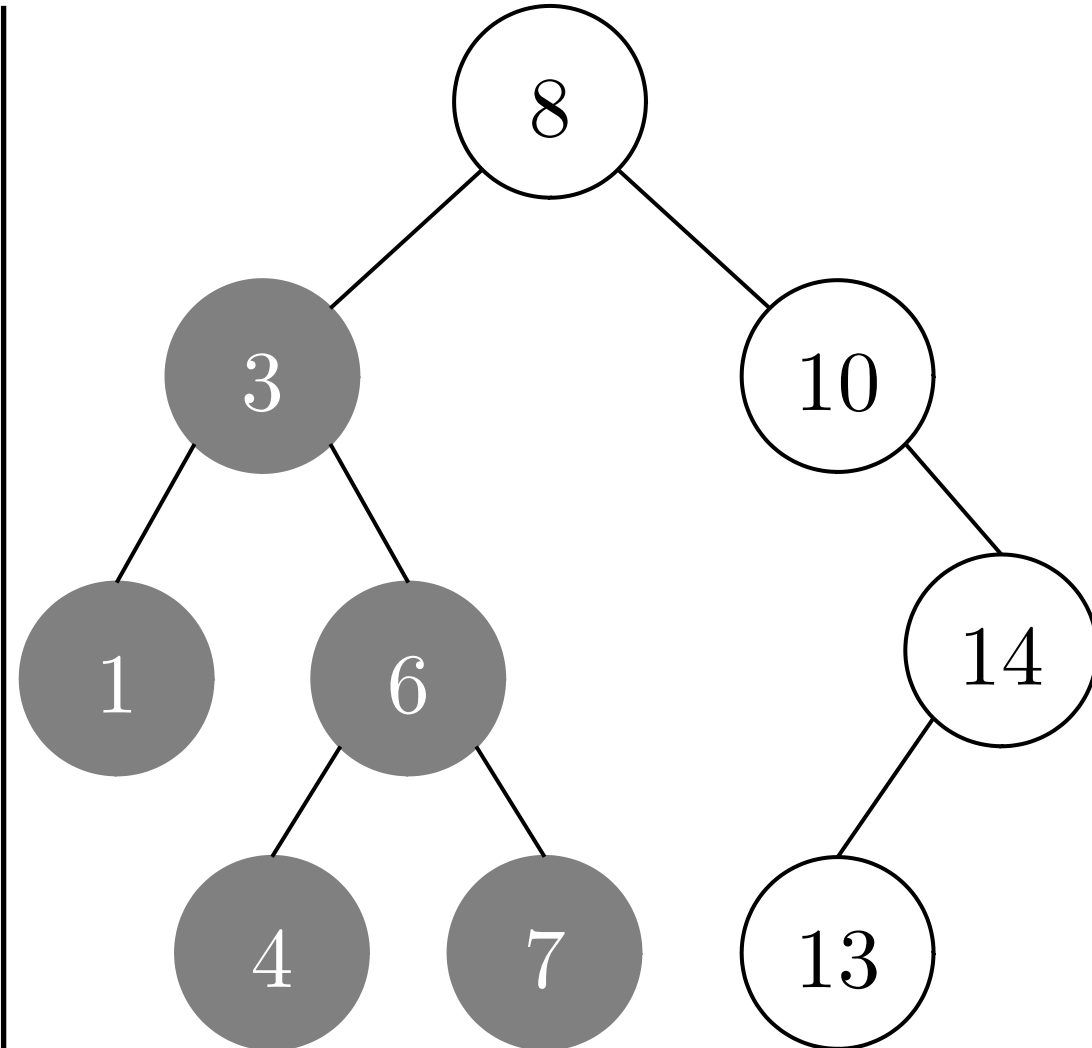
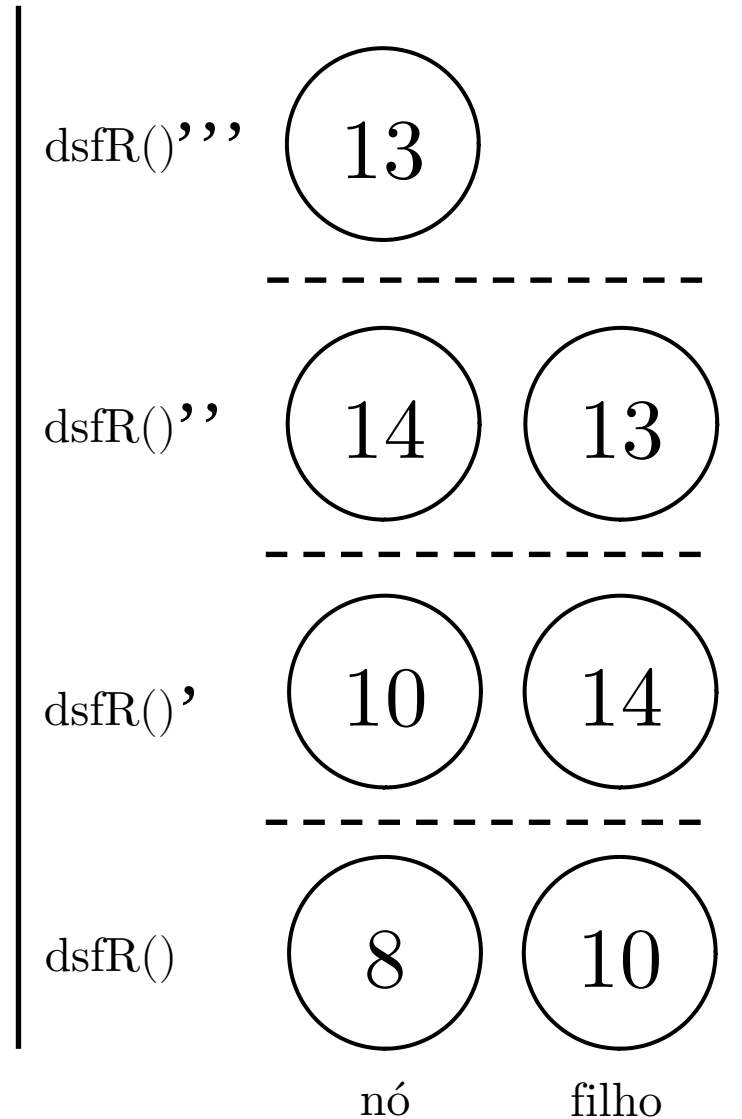
filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

dfsR()'''

13

dfsR()''

14

13

dfsR()'

10

14

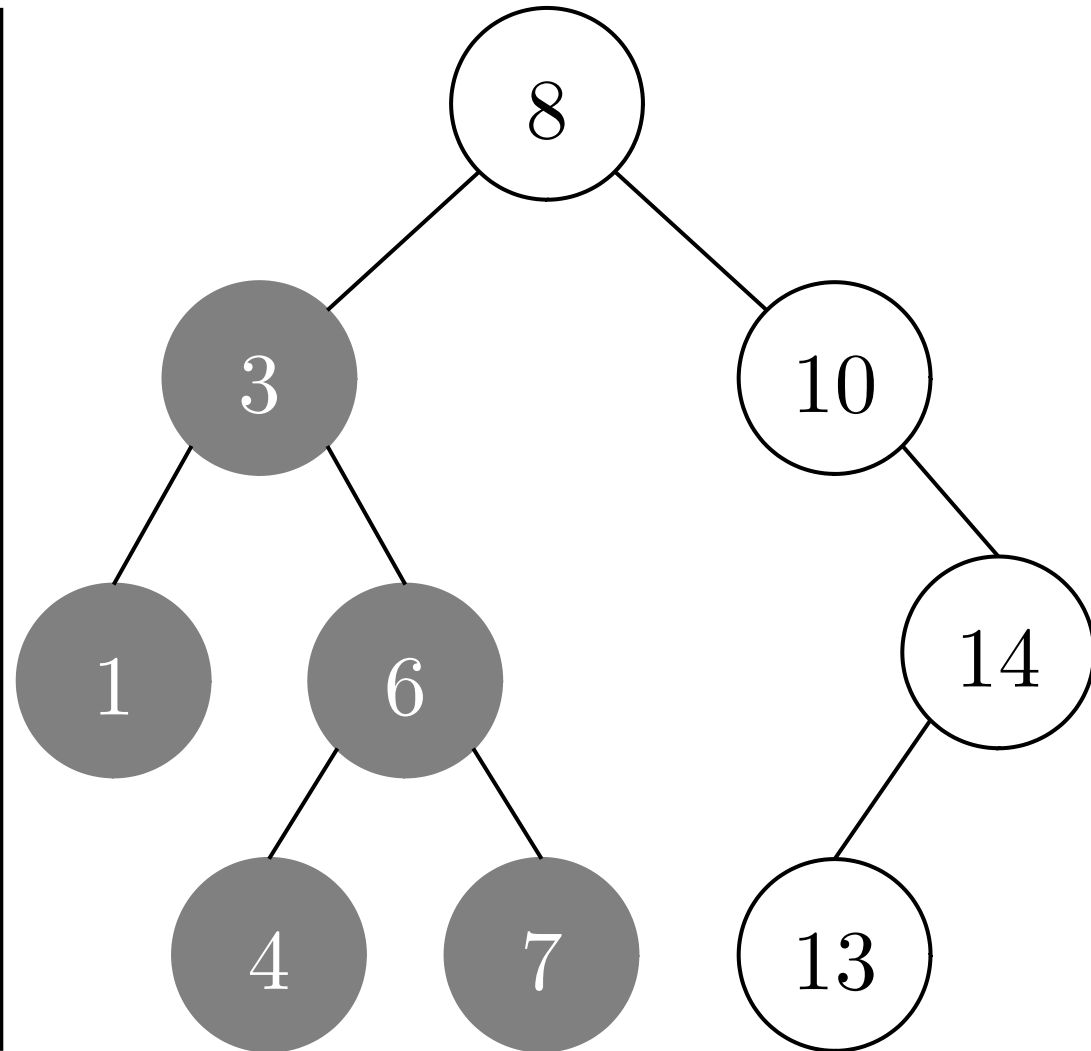
dfsR()

8

10

nó

filho



busca em profundidade

RECURSIVO

def dfsR(nó):

if (nó.visitado):

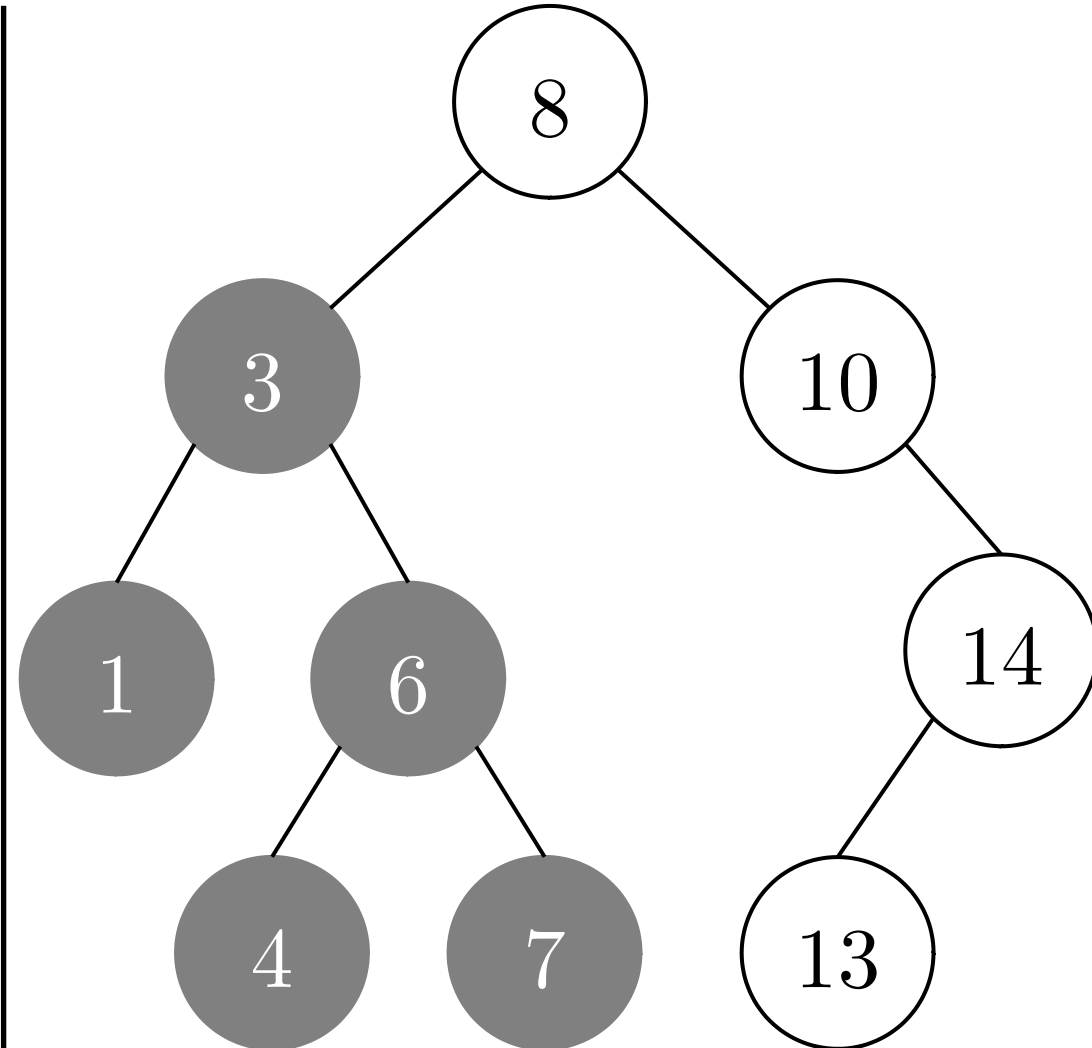
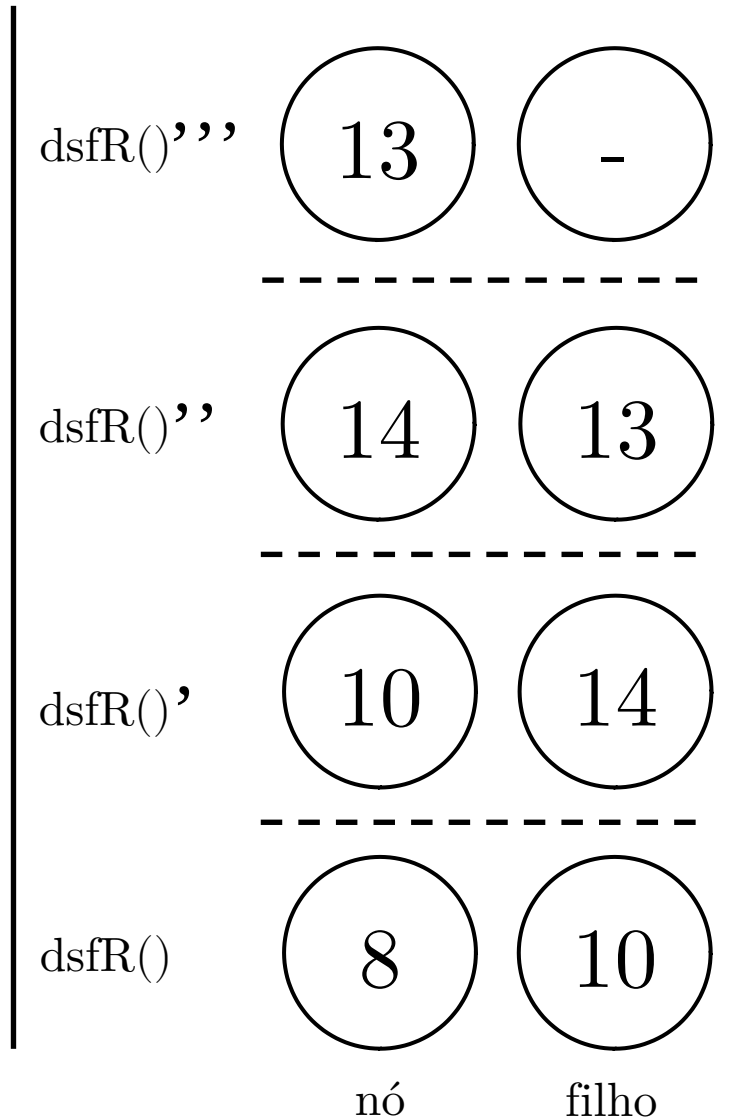
return

for filho in nó.filhos():

if (not filho.visitado):

dfsR(filho)

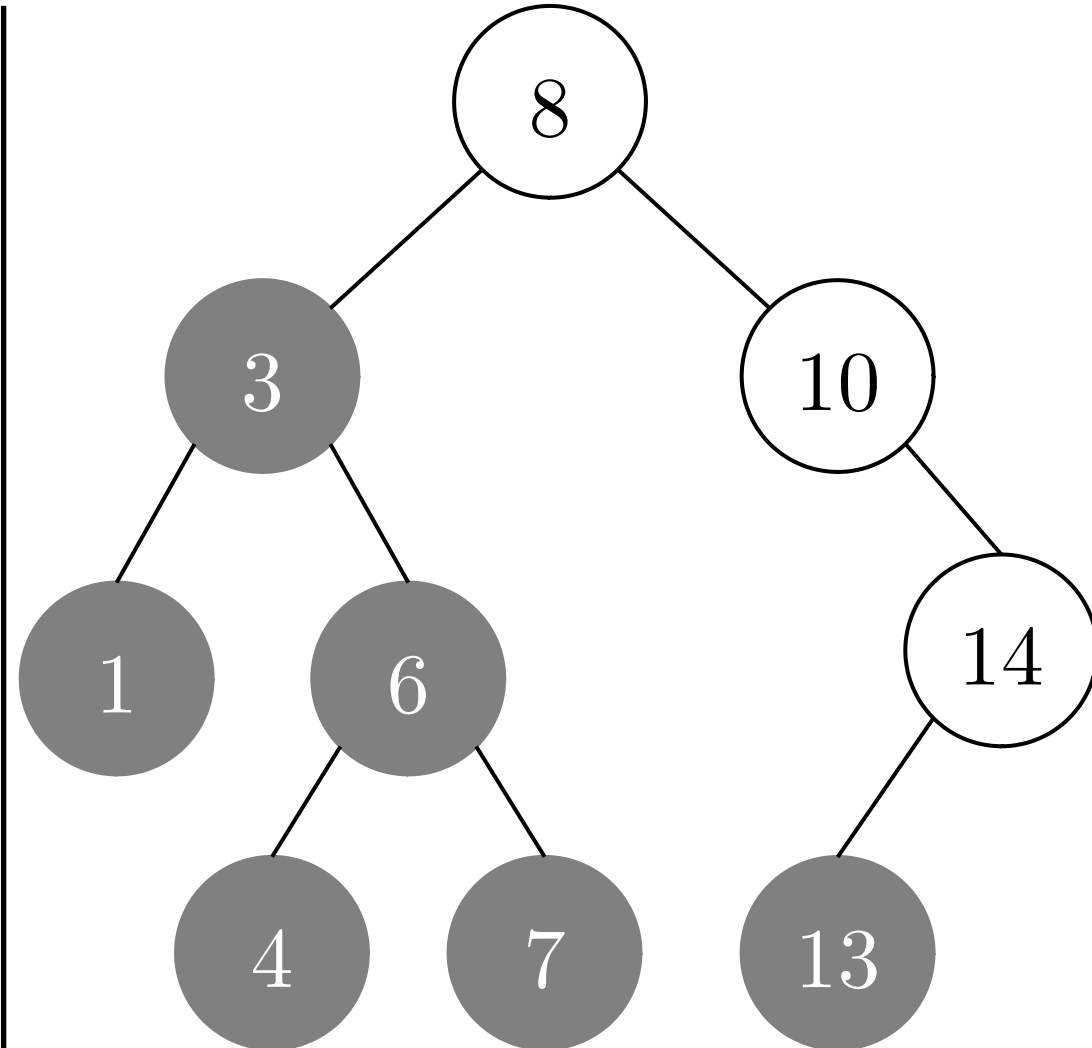
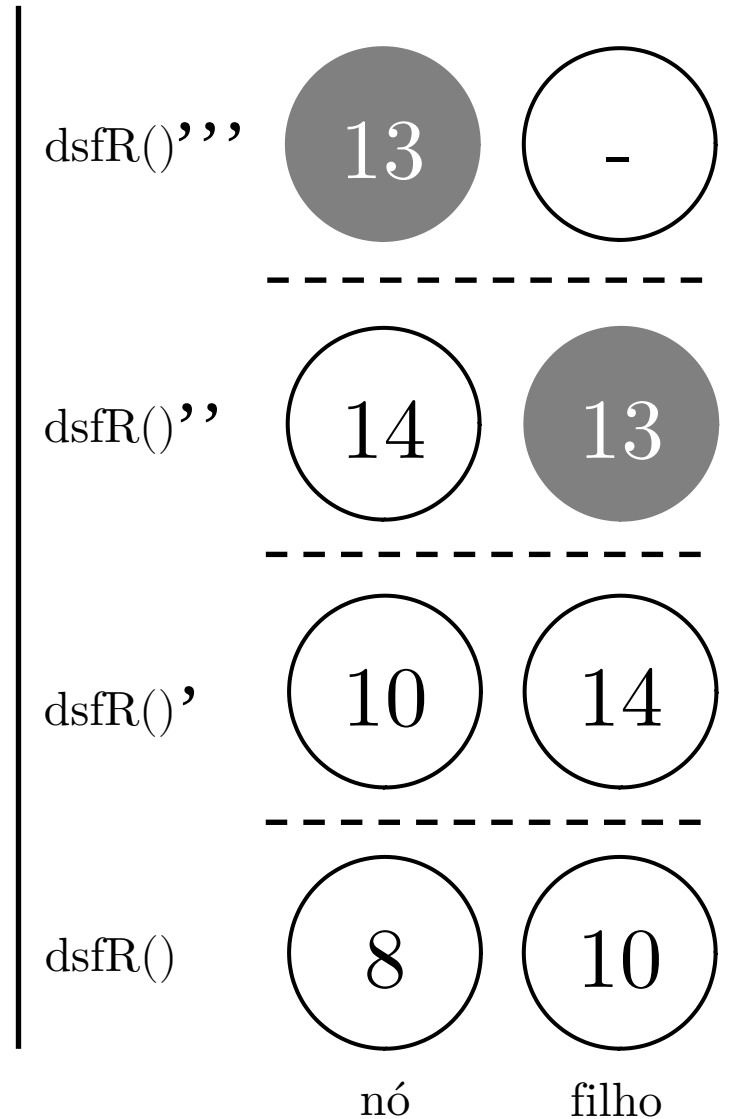
nó.visitado = True



busca em profundidade

RECURSIVO

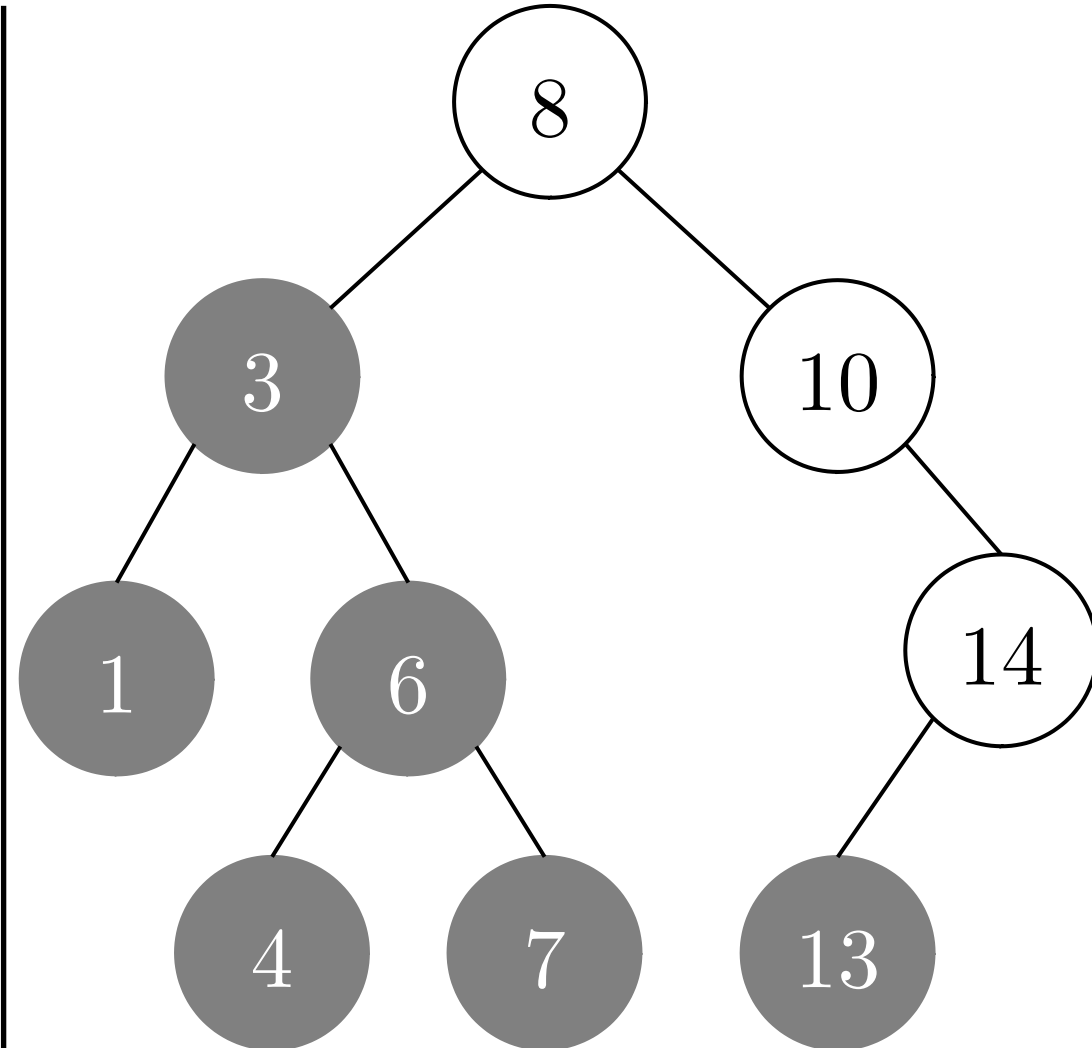
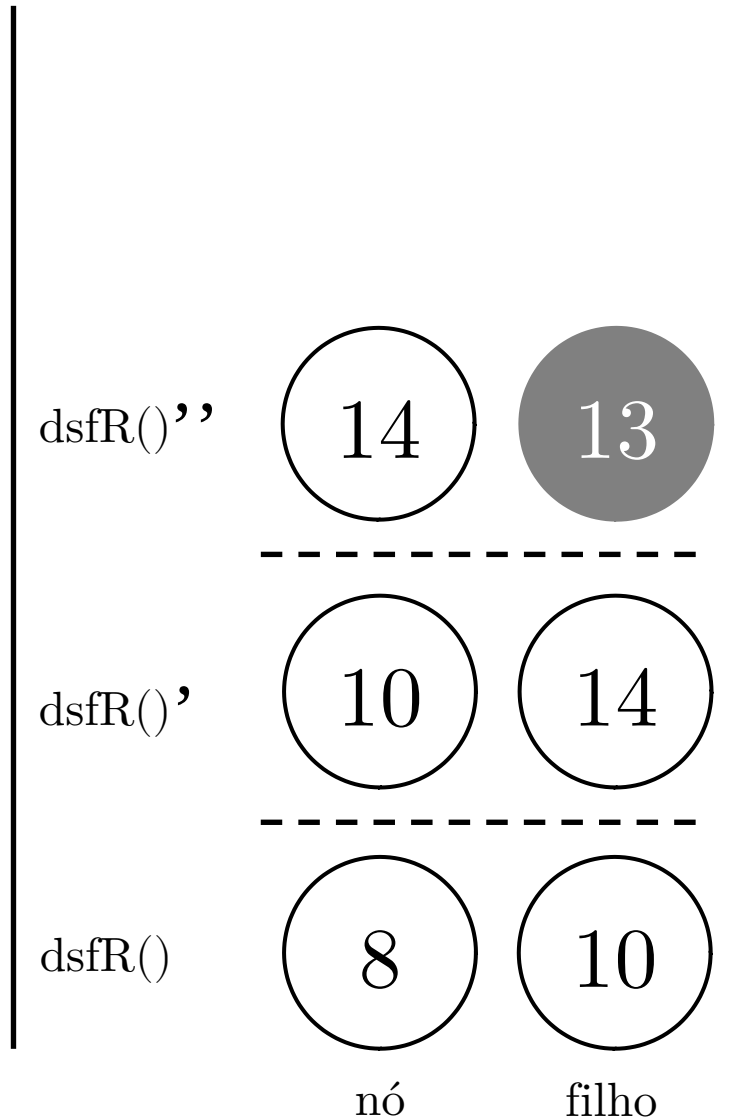
```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
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    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

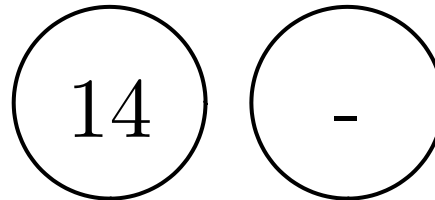
```
    for filho in nó.filhos():
```

```
        if (not filho.visitado):
```

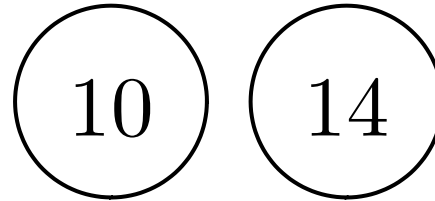
```
            dfsR(filho)
```

```
    nó.visitado = True
```

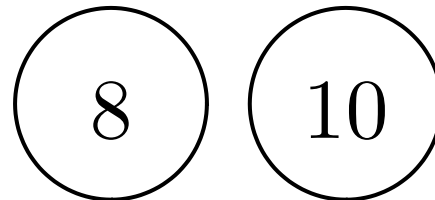
dfsR()''



dfsR()'

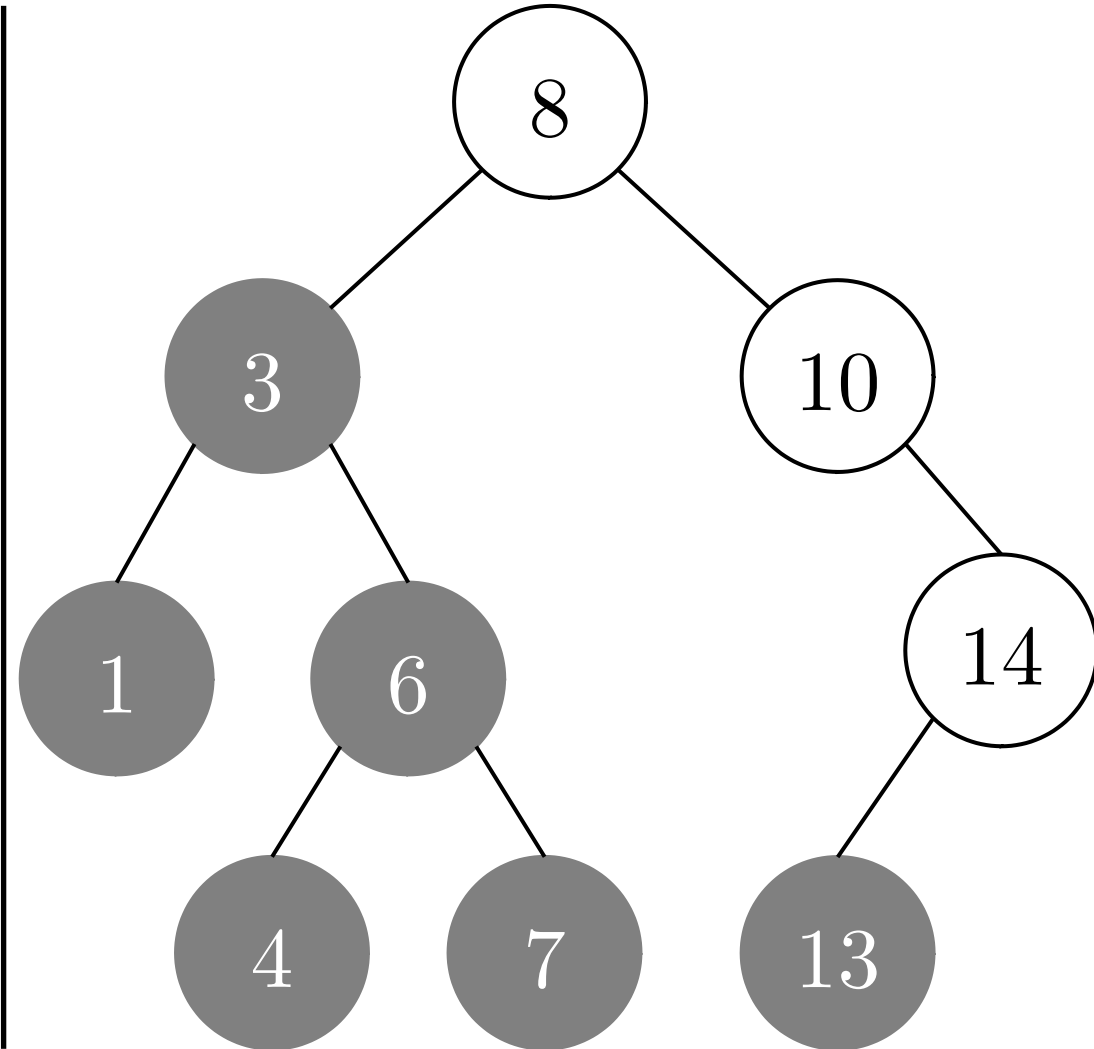


dfsR()



nó

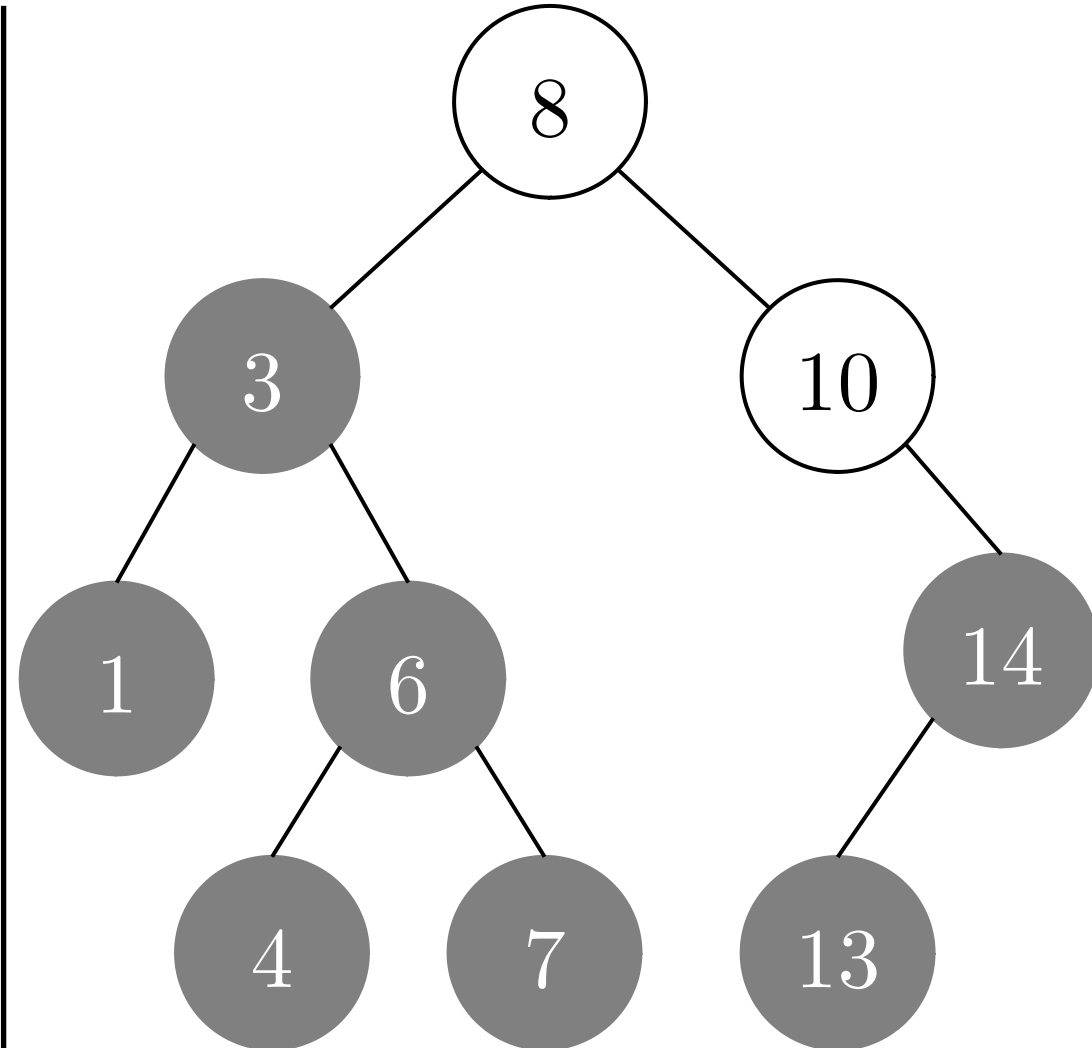
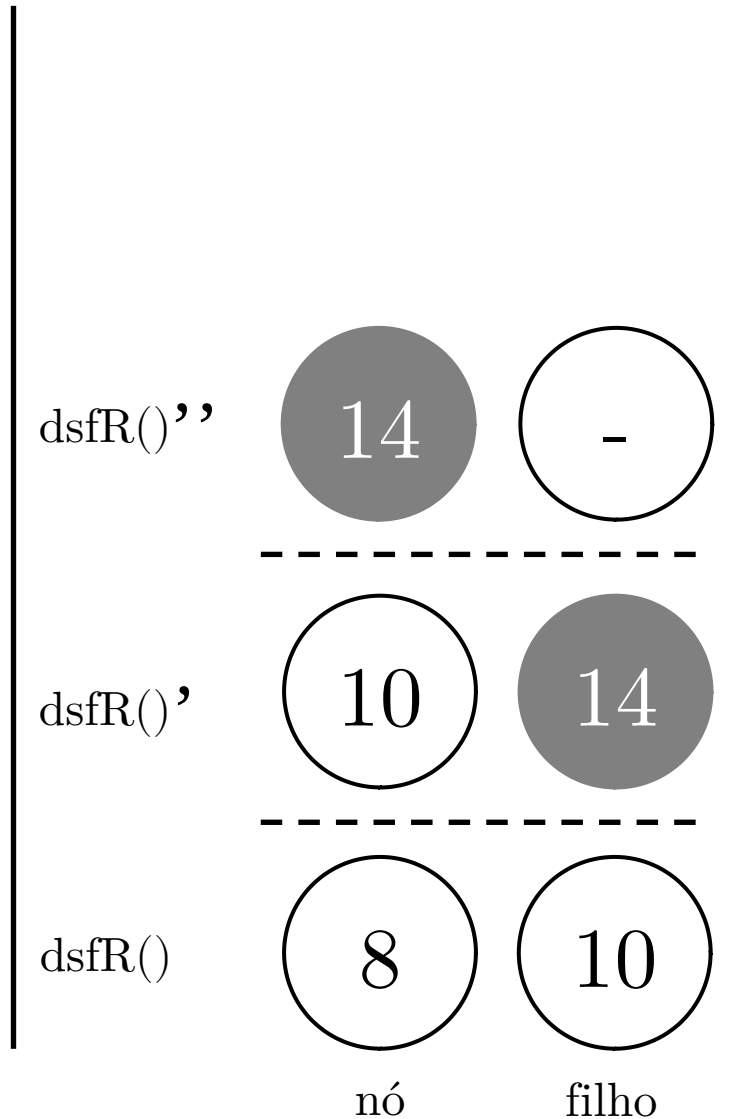
filho



busca em profundidade

RECURSIVO

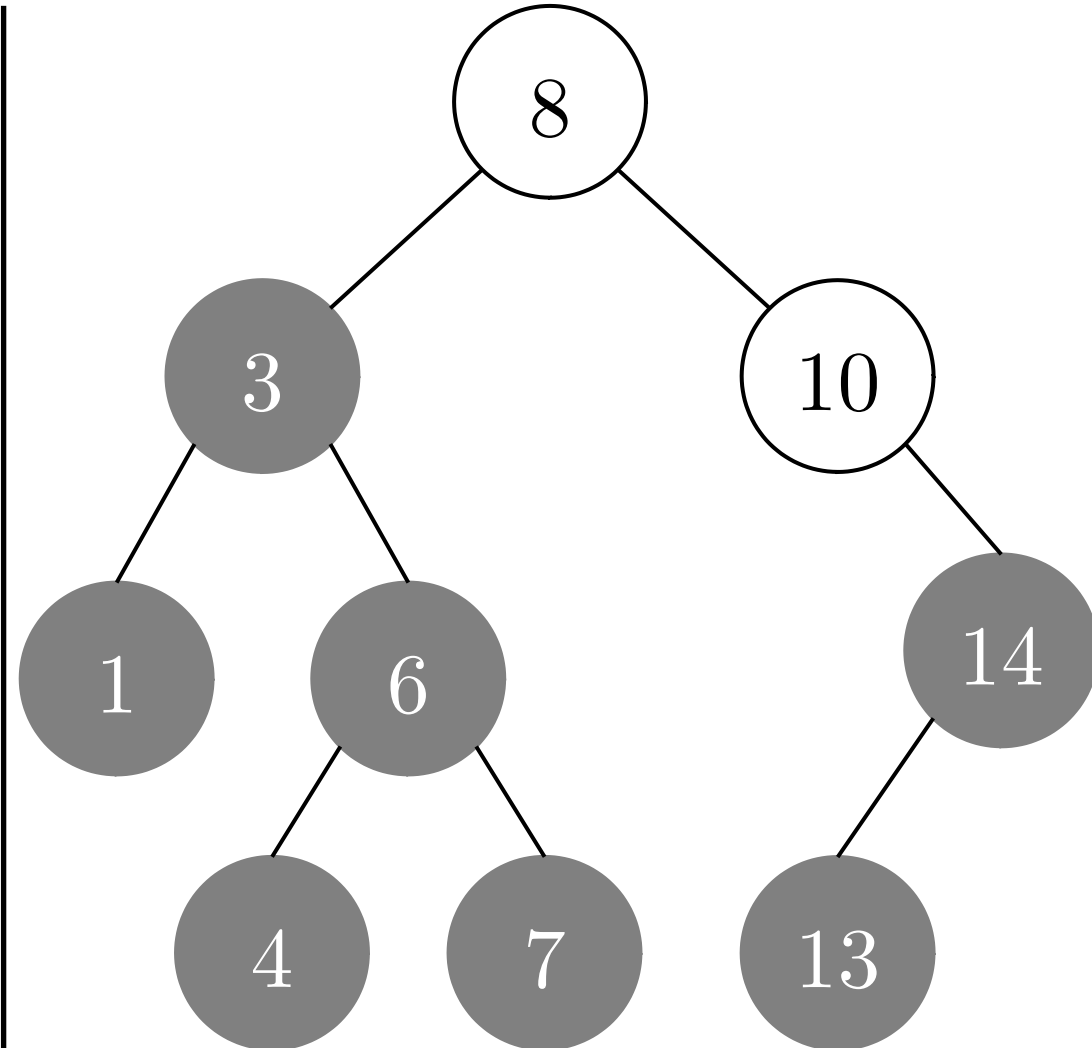
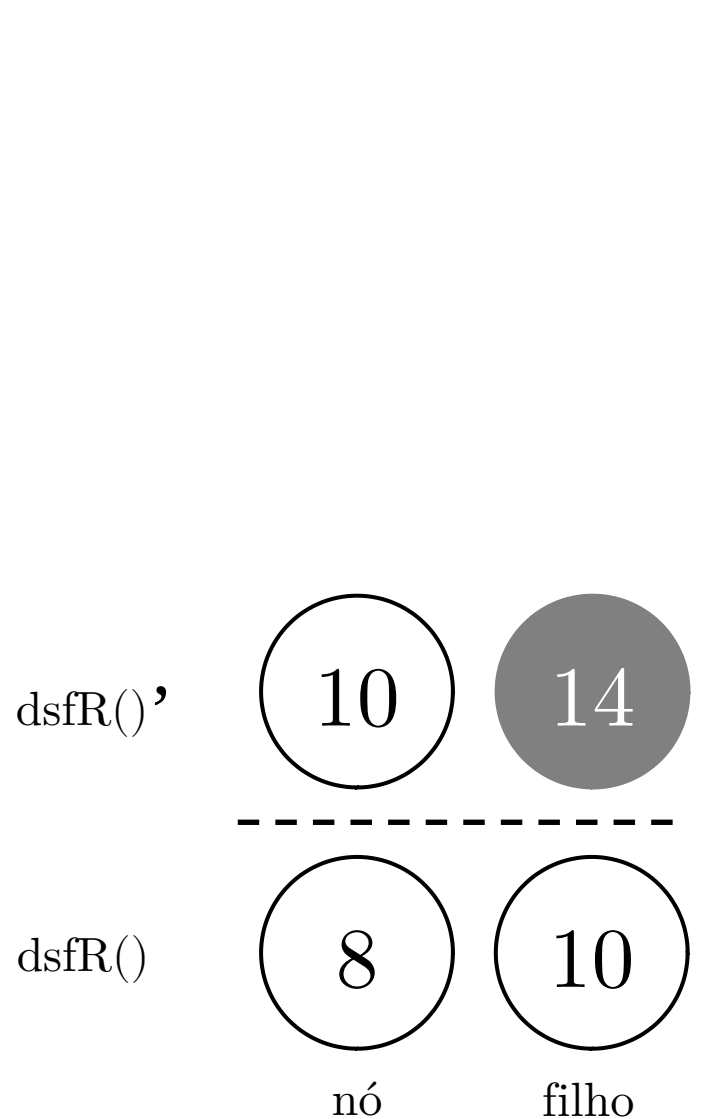
```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    → nó.visitado = True
```



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
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    for filho in nó.filhos():  
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            dfsR(filho)  
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```



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
```

```
        return
```

```
    for filho in nó.filhos():
```

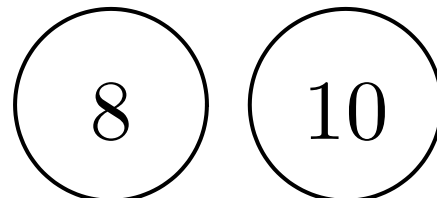
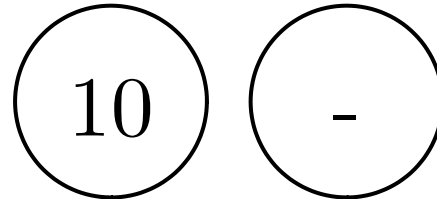
```
        if (not filho.visitado):
```

```
            dfsR(filho)
```

```
    nó.visitado = True
```

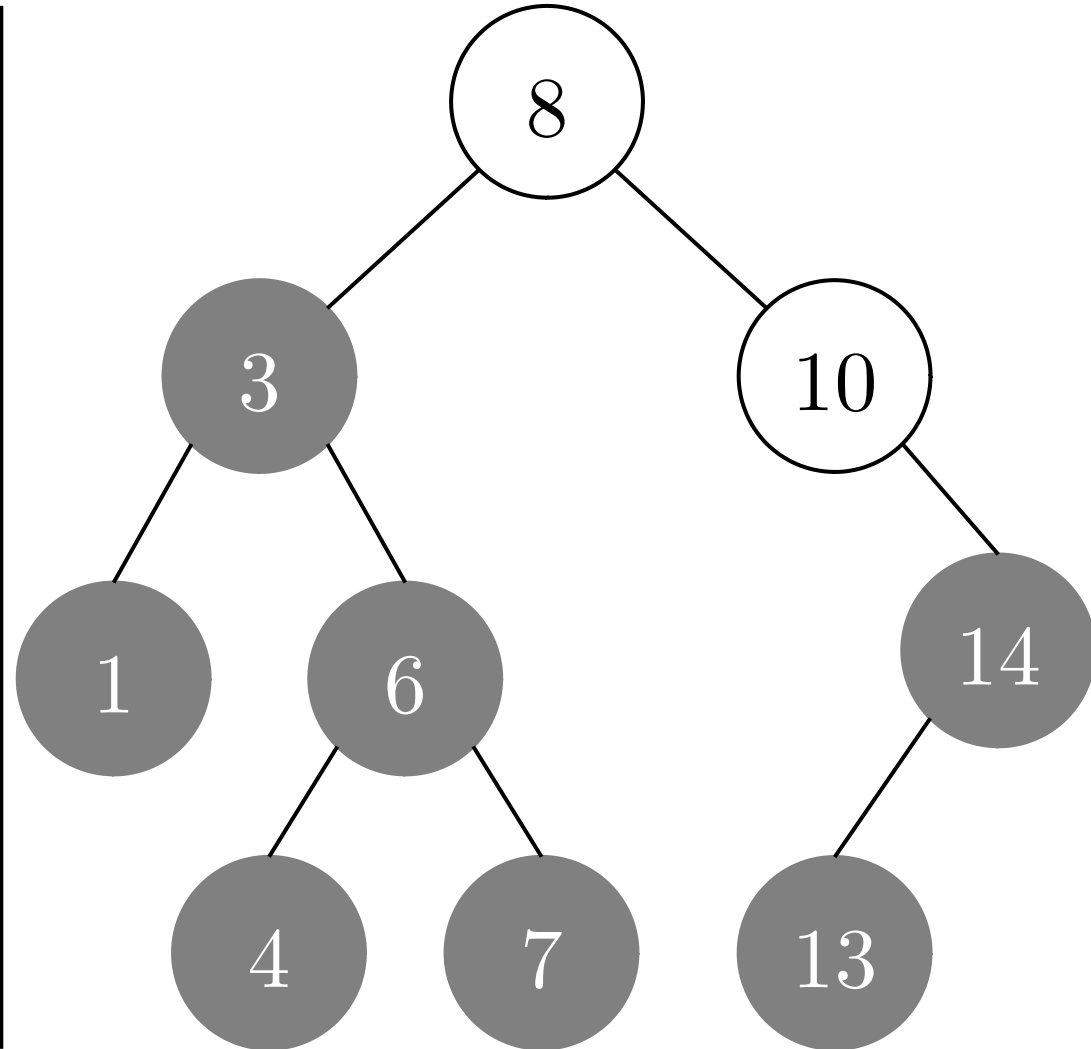
dfsR()'

dfsR()



nó

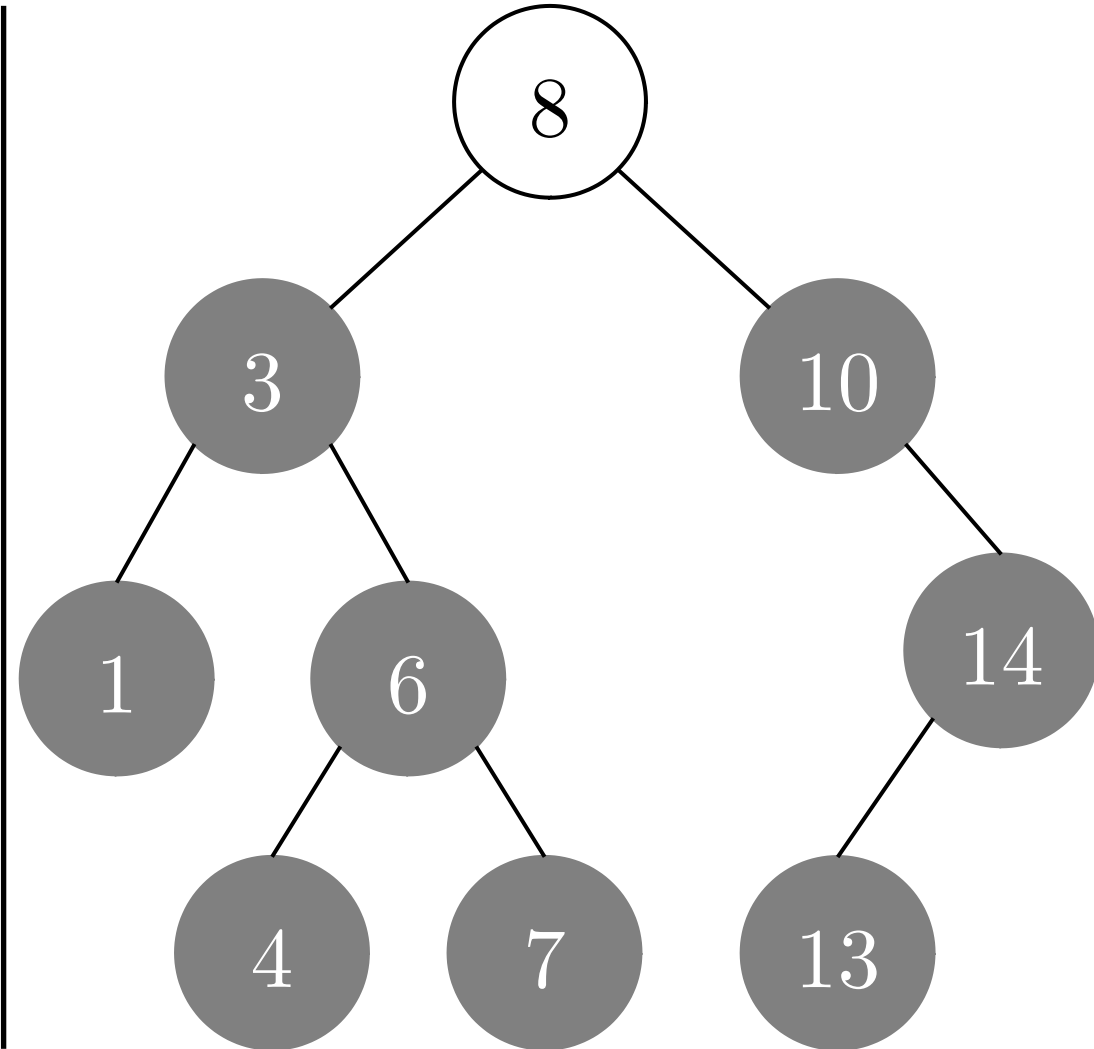
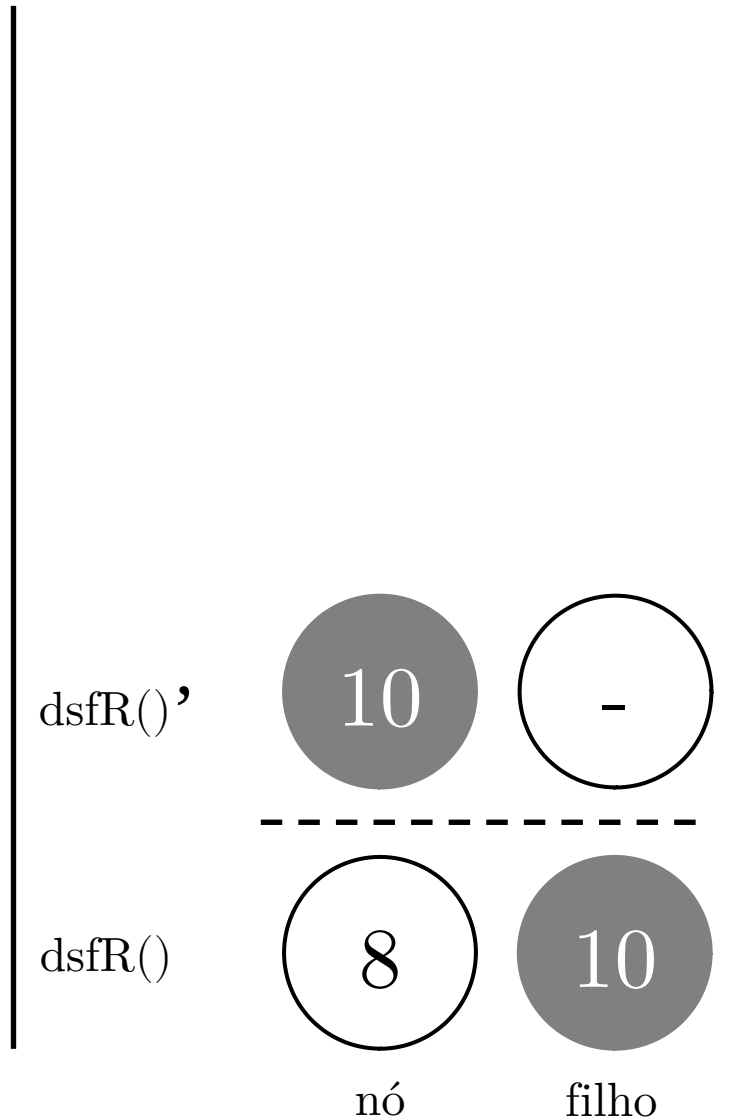
filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
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    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
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```

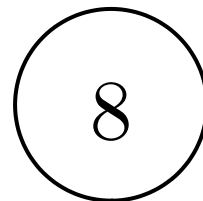


busca em profundidade

RECURSIVO

```
def dfsR(nó):  
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```

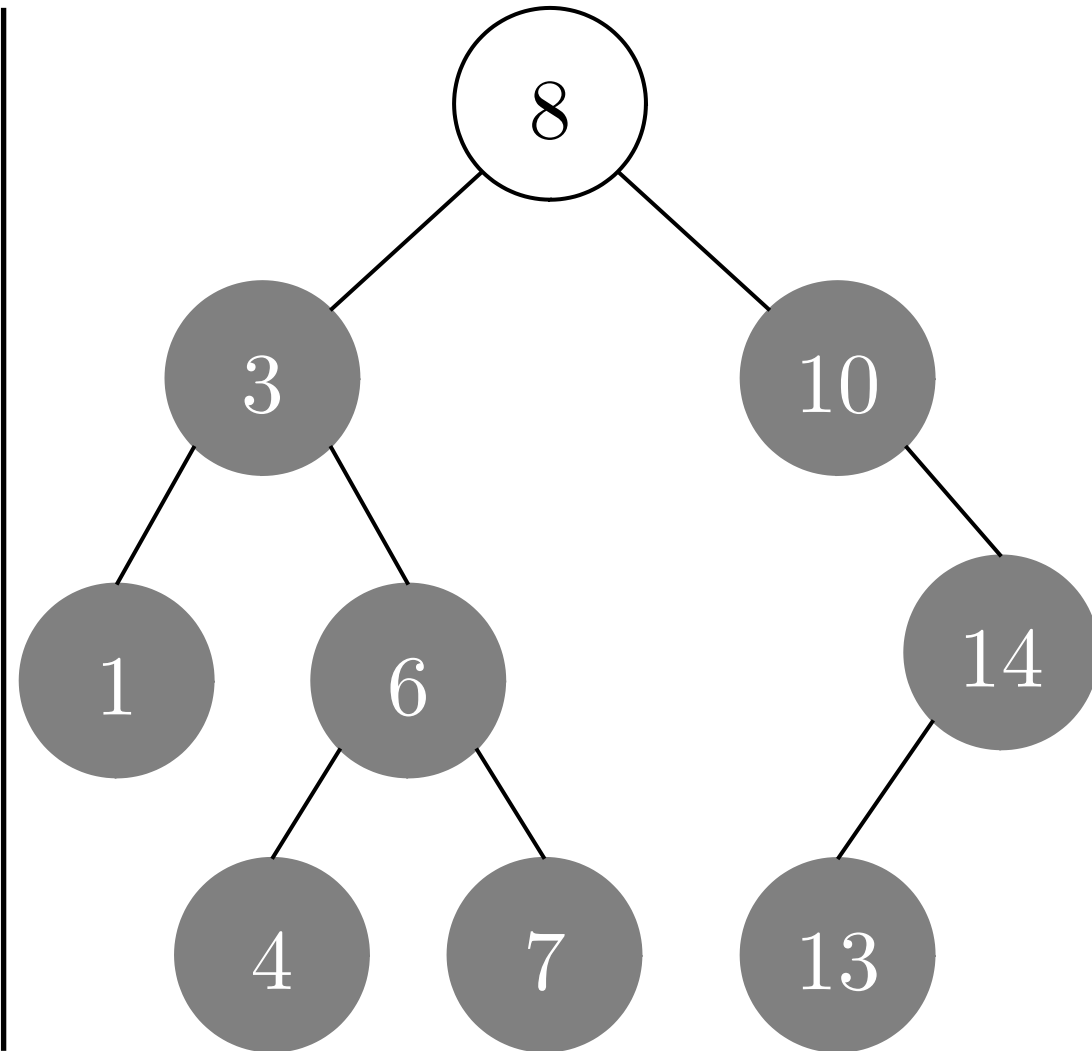
dfsR()



nó



filho



busca em profundidade

RECURSIVO

```
def dfsR(nó):
```

```
    if (nó.visitado):
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```
        return
```

```
    for filho in nó.filhos():
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```
        if (not filho.visitado):
```

```
            dfsR(filho)
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```
    nó.visitado = True
```

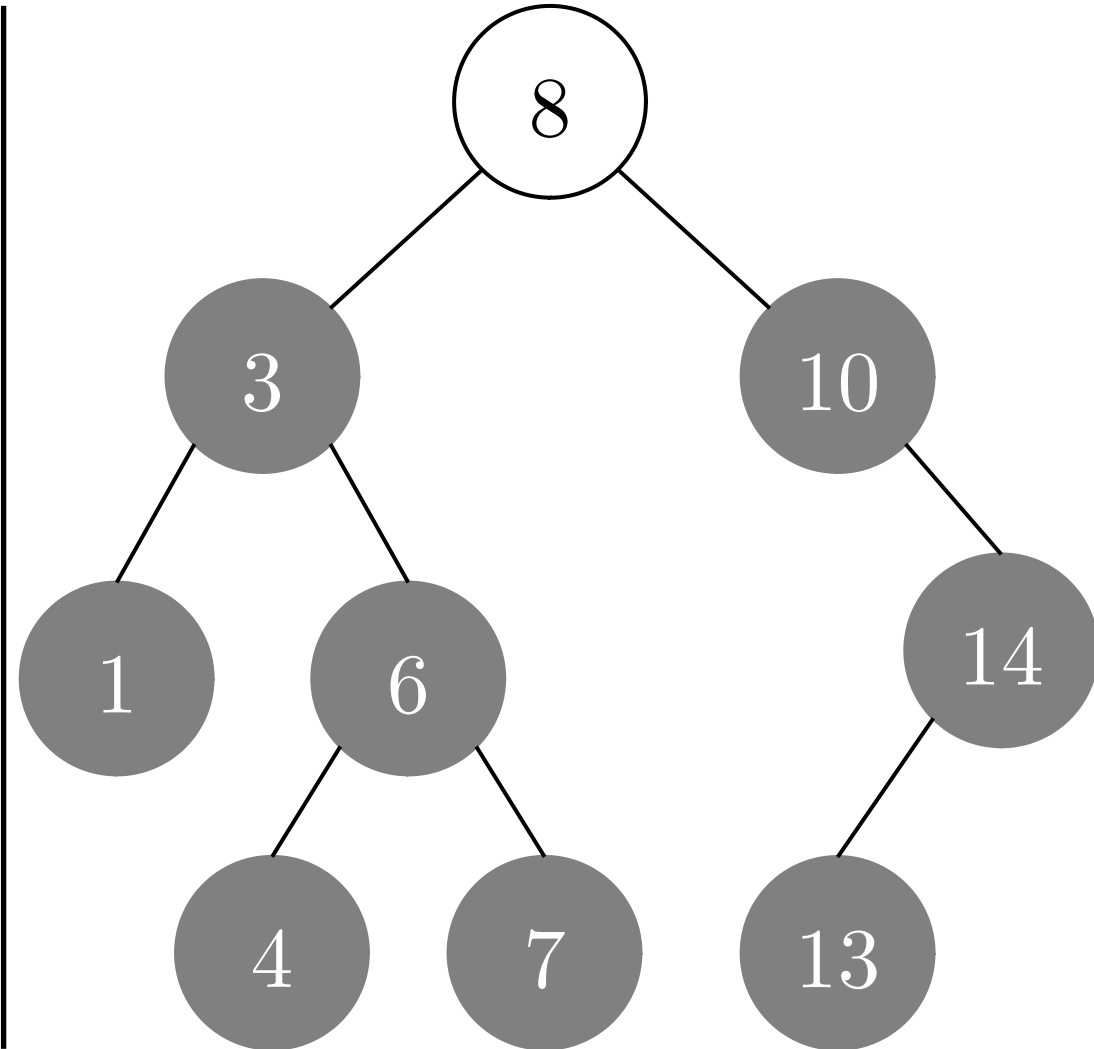
dfsR()

8

nó

-

filho

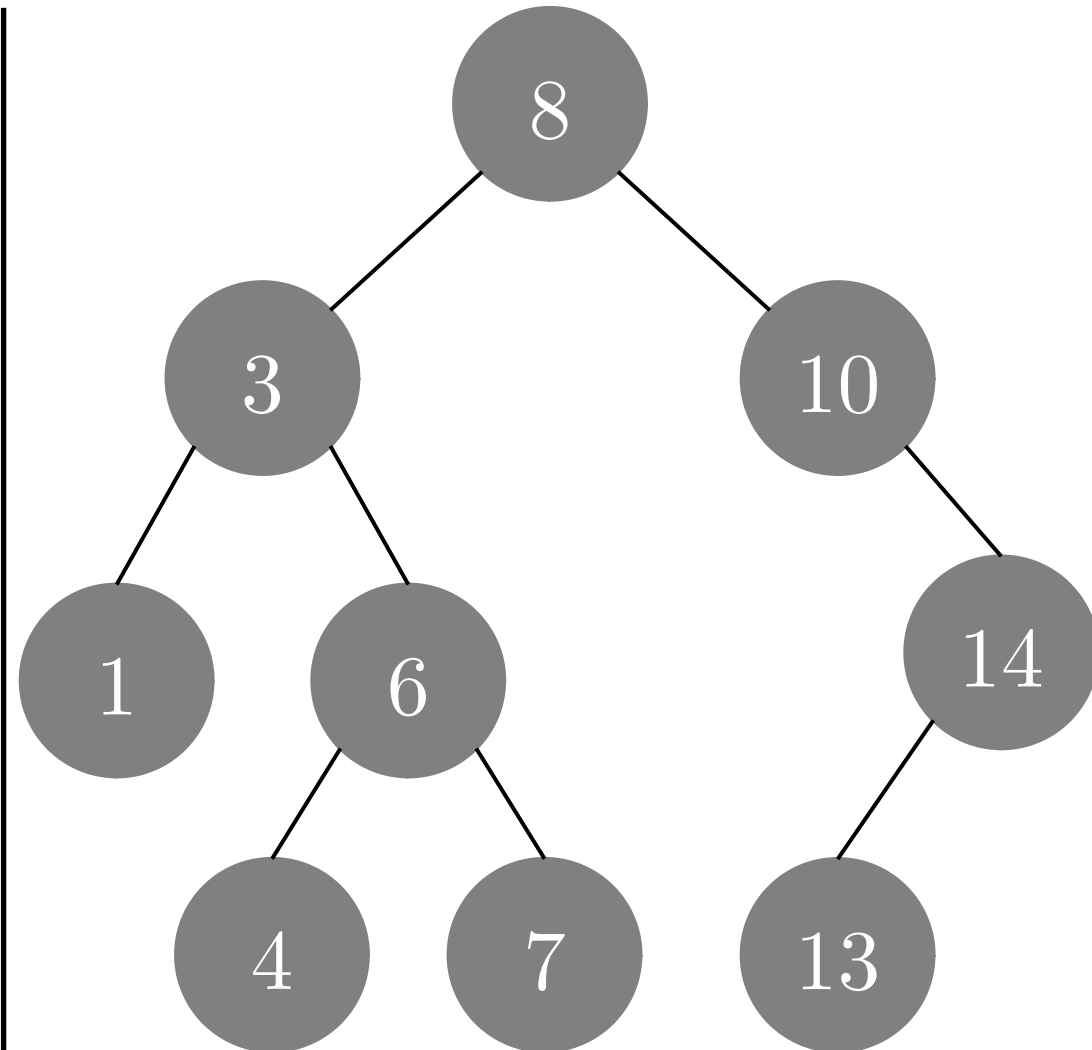
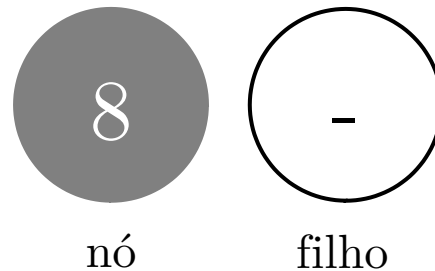


busca em profundidade

RECURSIVO

```
def dfsR(nó):  
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        if (not filho.visitado):  
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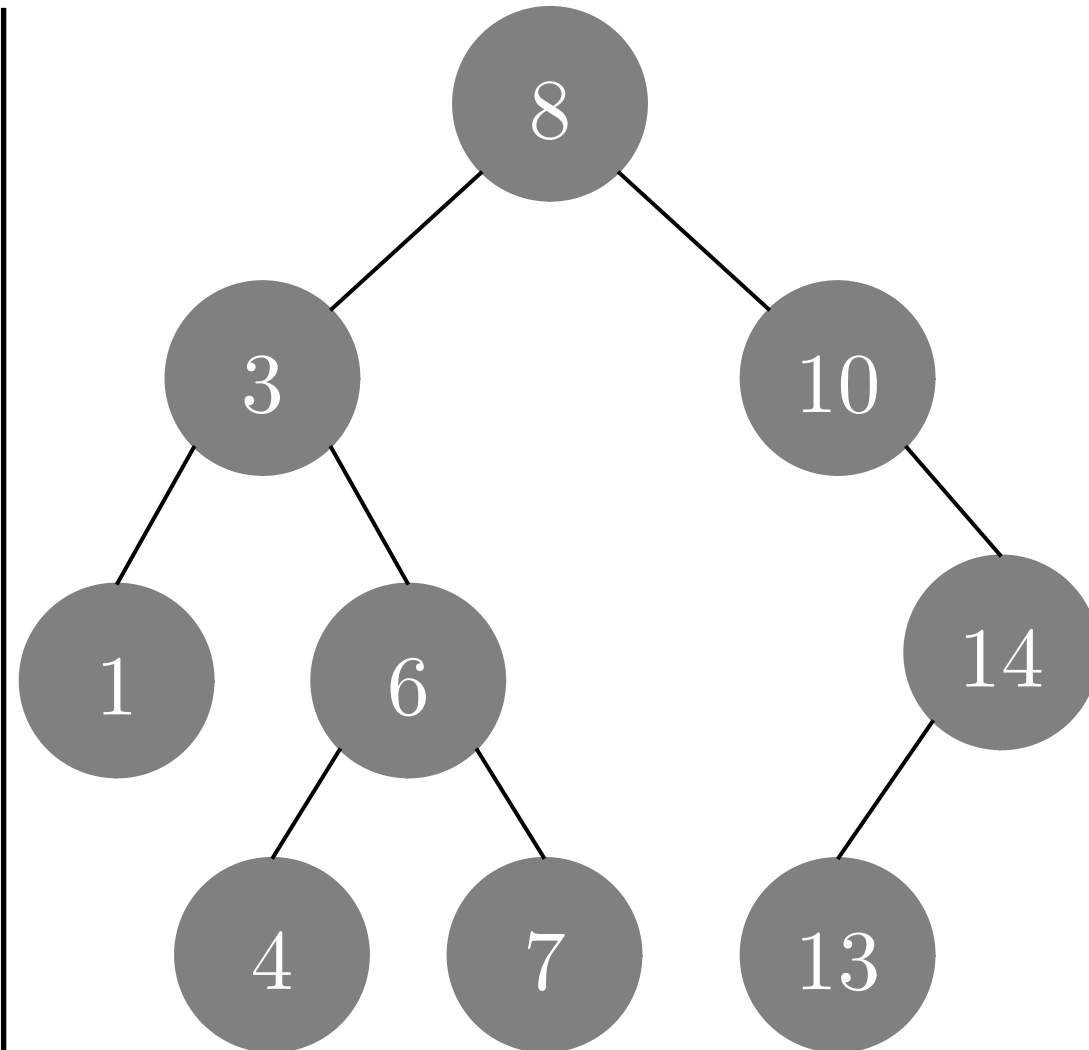
dfsR()



busca em profundidade

RECURSIVO

```
def dfsR(nó):  
    if (nó.visitado):  
        return  
    for filho in nó.filhos():  
        if (not filho.visitado):  
            dfsR(filho)  
    nó.visitado = True
```



backup **slides**



PUC-SP

obrigado

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