Part A: Construct FP-Tree

Step 1: Count Item Frequencies

| Item | Frequency | Support | Status |
|---|---|---|---|
| apples | 8 | 0.8 | ✓ |
| bananas | 6 | 0.6 | ✓ |
| carrots | 6 | 0.6 | ✓ |
| donuts | 4 | 0.4 | ✓ |
| eggs | 4 | 0.4 | ✓ |
| figs | 1 | 0.1 | ✗ |

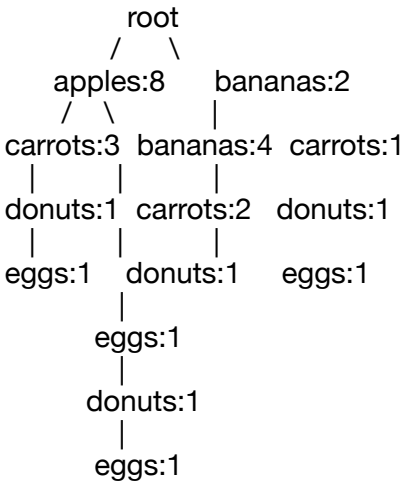
**Frequent Items Order:** apples (8) > bananas (6) > carrots (6) > donuts (4) > eggs (4)

Step 2: Reorder Transactions

| | | |
|---|---|---|
| 1 | {apples} | {apples} |
| 2 | {apples, carrots} | {apples, carrots} |
| 3 | {apples, carrots, donuts} | {apples, carrots, donuts} |
| 4 | {apples, bananas, eggs} | {apples, bananas, eggs} |
| 5 | {apples, bananas, carrots, donuts} | {apples, bananas, carrots, donuts} |
| 6 | {bananas, donuts, eggs} | {bananas, donuts, eggs} |
| 7 | {bananas, carrots, figs} | {bananas, carrots} |
| 8 | {apples, bananas, carrots} | {apples, bananas, carrots} |

| | | |
|---|---|---|
| 9 | {apples, bananas, donuts, eggs} | {apples, bananas, donuts, eggs} |
| 10 | {apples, carrots, eggs} | {apples, carrots, eggs} |

Step 3: FP-Tree Construction



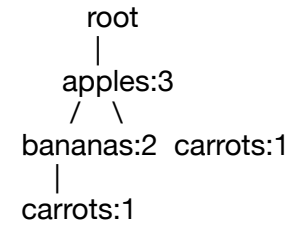

Part B:

Step 1: Conditional Pattern Base for Donuts
Paths to donuts nodes:
{apples:3, carrots:3} → donuts:1
{apples:4, bananas:4, carrots:2} → donuts:1
{apples:4, bananas:4} → donuts:1
{bananas:2} → donuts:1

Step 2: Conditional FP-Tree for Donuts

| | | | |
|---|---|---|---|
| apples | 1 + 1 + 1 = 3 | 3/10 = 0.3 | ✓ |
| bananas | 1 + 1 + 1 = 3 | 3/10 = 0.3 | ✓ |
| carrots | 1 + 1 = 2 | 2/10 = 0.2 | ✓ |

Conditional FP-Tree:




Step 3: Frequent Item sets Ending with Donuts

All Frequent Item sets containing donuts:

• {donuts}: support = 4/10 = 0.4
• {apples, donuts}: support = 3/10 = 0.3
• {bananas, donuts}: support = 3/10 = 0.3
• {carrots, donuts}: support = 2/10 = 0.2
• {apples, bananas, donuts}: support = 2/10 = 0.2
• {apples, carrots, donuts}: support = 1/10 = 0.1
• {bananas, carrots, donuts}: support = 1/10 = 0.1
• {apples, bananas, carrots, donuts}: support = 1/10 = 0.1

Final Frequent Item sets with Donuts (support ≥ 0.2):
1. {donuts}
2. {apples, donuts}
3. {bananas, donuts}
4. {carrots, donuts}
5. {apples, bananas, donuts}