Test 1 Bradley Harper

1 Basis: $n=4$ $(100^{n+1}-1)/99$

$(100^{4+1}-1)/99$

$(100^5-1)/99$

$(10000000000-1)/99$

$1+100+\cdots+100^4 = 10101010101$

$10101010101 = 10101010101$

Induction Step $n=k$

Assume: $1+100+\cdots 100^k = (100^{k+1}-1)/99$

$n=k+1$

$\underbrace{1+100+\cdots+100^k}+100^{k+1} = (100^{(k+1)+1}-1)/99$

$(100^{k+1}-1)/99 + 100^{k+1} = (100^{(k+1)+1}-1)/99$

$\frac{100^{k+1}-1}{99} + \frac{99(100^{k+1})}{99} = \frac{100^{(k+1)+1}-1}{99}$

$\frac{100^{k+1}-1+99(100^{k+1})}{99} = \frac{100^{k+1+1}-1}{99}$

$\frac{100^{k+1}(1+99)-1}{99}$

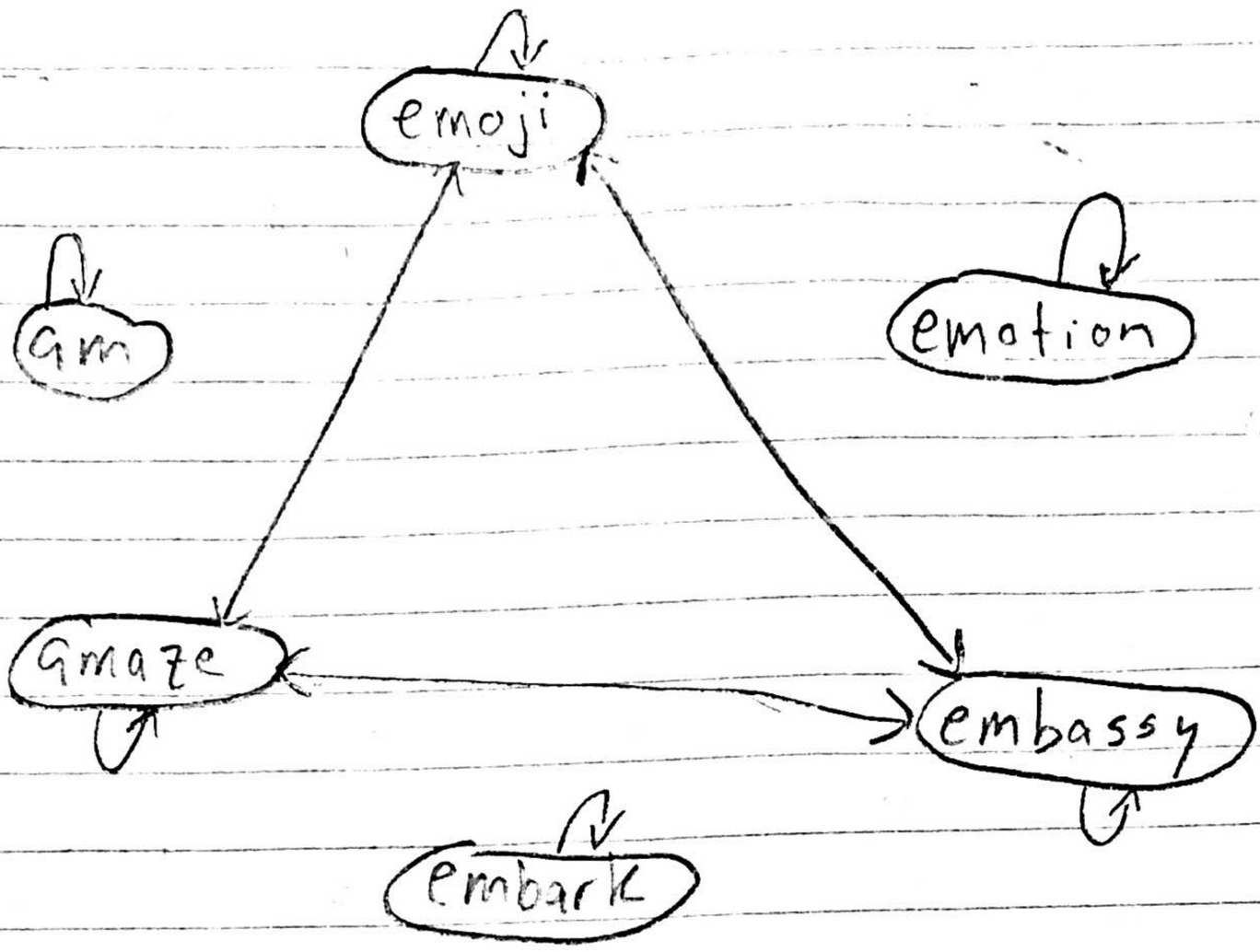
$= \frac{100^{k+1}(100)-1}{99}$

$= \frac{100(100)^{k+1}-1}{99}$

✓ $= \frac{100^{k+1+1}-1}{99} = \frac{100^{k+1+1}-1}{99}$ ✓

2. 100

3



Reflexive ✓
Symmetry ✓
Transitive ✓

V. is an equivalence relation.
4 equivalence classes.

4 a. {f, u, n, y}
b. y
c. n
d. F can only be preceded by f
e. if yz, then nyz. If nz, then nnz. If nz, unz. If yz, fuz.

FUNNY

5 Basis: (0, s(s(0))) ∈ Threetimesplustwo
If (x, y) ∈ threetimes plus two
Then (s(s(x)), (s(s(s(s(0)))) ∈ Threetimesplustwo

Testing: Threetimesplustwo = {(0, s(s(0))), (s(0), s(s(s(s(0))))),
(s(s(0)), s(s(s(s(s(s(0))))))}

$3(x+1)+2 = 3x+3+2$
$= 3(x+1)+2$

FFF, FF7F, FFλ,

F7F, F7.7F, F7λ,

~~F~~, ~~F~~, Fλ, ~~F~~, λ7F, ~~λ~~
F λ

6. $F \bigcup_{i=1}^{\infty} E^{2i} \cup D$

FFF, FF7F, FF, F7F, F7.7F,
F7, F, 7F, λ

7 a. True
b. False

8. a. True
b. False
c. False $|GH| = 9$

9 $GF = FG$, $G \times F = F \times G$, $|GF| \neq |F \times G|$

10 The empty set & the set containing the empty set
$\Phi \in \{\lambda\}$, $\Phi^* = \{\lambda\}$. $|\Phi^*| = 1$, $\Phi^2 = \Phi$, $|\Phi^+| = 0$ $\{\lambda\}$

11 Basis: $(\lambda) \in L$, $h \in L$, $hf \in L$
Rec Step: If $x \in L$ and $x \in \{\lambda\}^*$ then $xhh \in L$
If $x \in L$ and $x \in \{h\}^*$ then $xhh \in L$
If $x \in L$ and $x \in \{hf\}^*$ then $xhf \in L$

12 $\Sigma = \{W, R, S, C, A, F, M, H, Z\}$

First letter of each item, use Z for swiss because S is already taken

Bread: (W)heat, (R)ye, (S)ourdough

Protein: (C)hicken, (A)vacado

Cheese: (F)eta, (M)ozzarrella, (H)avarti, Sw(Z)ss