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CS 210

Assignment #2

3/30/2023

1) $\langle \text{pattern} \rangle ::= \langle \text{variable} \rangle \mid \langle \text{constant} \rangle \mid \langle \text{tuple} \rangle \mid \langle \text{list} \rangle \mid \langle \text{cons} \rangle$
 $\langle \text{more patterns} \rangle ::= \langle \text{pattern} \rangle \langle \text{more patterns} \rangle \mid \langle \text{empty} \rangle$
 $\langle \text{tuple} \rangle ::= (\langle \text{pattern} \rangle, \langle \text{pattern} \rangle \langle \text{more patterns} \rangle) \mid \langle \text{list} \rangle @ \langle \text{list} \rangle$
 $\langle \text{list} \rangle ::= [] \mid [\langle \text{list element} \rangle \langle \text{more list elements} \rangle]$
 $\langle \text{cons} \rangle ::= \langle \text{list element} \rangle :: \langle \text{list} \rangle \mid \langle \text{list element} \rangle \langle \text{more cons} \rangle :: \langle \text{list} \rangle$
 $\langle \text{more list elements} \rangle ::= \langle \text{list element} \rangle \langle \text{more list elements} \rangle \mid \langle \text{empty} \rangle$
 $\langle \text{more cons} \rangle ::= \langle \text{list element} \rangle \langle \text{more cons} \rangle \mid \langle \text{empty} \rangle$

2)b)

| Step | Action |
|------|---|
| 1 | $x = 3k$; k is an integer |
| 2 | $y = 24m$; m is an integer |
| 3 | $y = 24m$ $= 3(8m)$ $x = 3k$; k is an integer because $(8m)$ is an integer |
| 4 | $\therefore x := y$ is safe |

c) Counter example: 7 is a prime integer greater than 3
and is not divisible by 3
 $\therefore z := x$ is unsafe

Back Side

e) Step Action

- 1 $y = 24k$; k is an integer
- 2 z is a prime integer > 3
- 3 This must mean z is odd
- 4 $z^2 - 1 = (z-1)(z+1)$
- 5 $(z-1) \div (z+1)$ are both even integers
 \div because they are both consecutive even integers,
 either $(z-1)$ is a multiple of 4 \div $(z+1)$ is a
 multiple of 2 or $(z-1)$ is a multiple of 2
 \div $(z+1)$ is a multiple of 4
- 6 $(z-1)$ or $(z+1)$ must also be a multiple of 3
 because $(z-1)$, z , \div $(z+1)$ are 3 consecutive integers;
 z can't be divisible by 3 because it is prime
- 7 $y = 2 \cdot 3 \cdot 4 \cdot k = 24k$; this means $24k$ is divisible by 2, 3, \div 4
- 8 $\therefore Y := (z * z) - 1$ is safe

Work: x is prime integer > 3
 $x^2 - 1 = (x-1)(x+1)$

$(x-1) \times (x+1)$
 even odd even

