Name _____ KEY _____

Instructions: Show all work. Justify answers as completely as possible. If you are asked to prove something, mere computation is not enough. You must explain your reasoning. Be sure to state your conclusion clearly. Incomplete work or justification will not receive full credit. Use exact answers unless specifically asked to round.
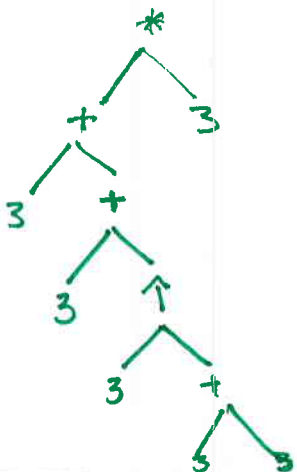
1. Write the mathematical expression $(x + xy)^2 + \left(\frac{x}{y}\right)$ using a rooted tree. Then express it in the specified notation.
   a. Infix notation
   b. Prefix notation
   c. Postfix notation

$(x + (x*y)) \uparrow 2 + (x/y)$

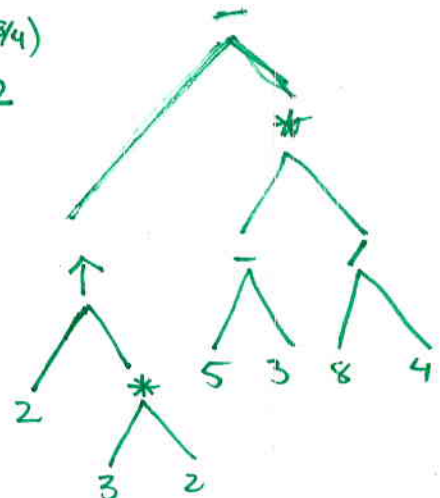$+ \uparrow + x * x y 2 / x y$

$x x y * + 2 \uparrow x y / +$
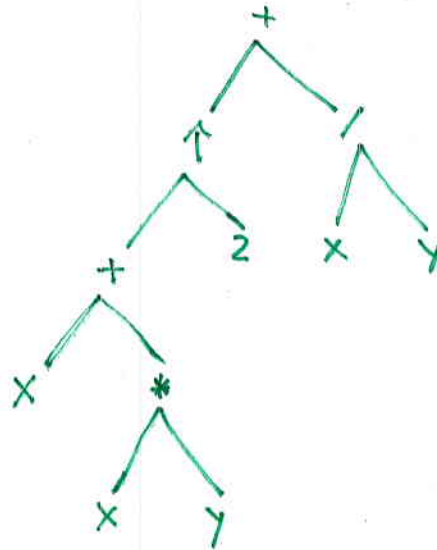
2. For the expressions $*+3+3\uparrow3+333$ in prefix notation, and $32*2\uparrow53-84/*-$ in postfix notation, find their numerical value.
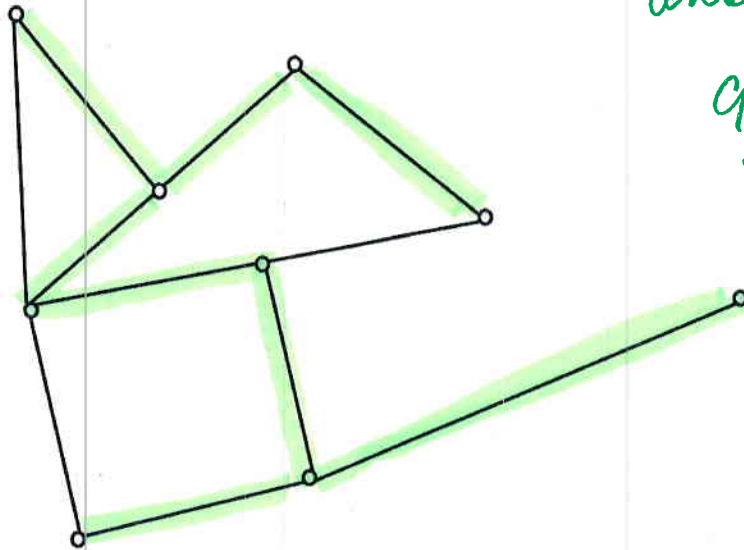
$(3\cdot2)^2 - (5-3)(8/4)$

$36 - 4 = 32$

$\left[3 + \left(3 + 3^{(3+3)}\right)\right]3$

$(3 + 3 + 3^6)3 = (735)3 = 2205$

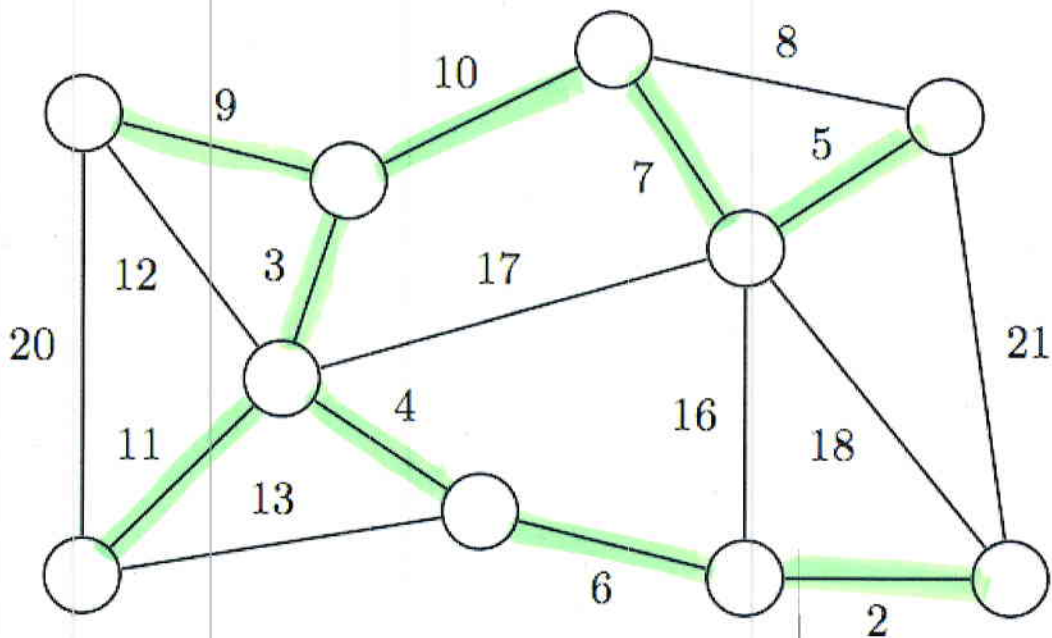3. Find a spanning tree for the graph below:

answers will vary

9 vertices
8 edges
leave out 3

4. Find a Minimum Spanning Tree for the graph shown below using Kruskal's Algorithm.

total weight = 57