#	Question	Answer(s)
1	Can you use KVL/KCL with superposition?	Yes for each step (each time we turn off all but one sources) we can definitely use KVL/KCL and NVA to solve for the simplified circuit.
2	So should we use linear algebra, or do NVA three different times?	With 3 different sources, you can setup 3 different circuits from superposition, and solve each with NVA. Then you sum the results.
3	Could we go over I–V relationships today?	If you're asking about the basic IV relationships of circuit elements, we've already moved forward from that. Please review previous lectures and notes and drop by office hours so we can help you catch up.
4	so not all circuits have elements with values of one digit in real life :o	there are plenty of 1.2KOhm resistors we use in real life :), or 3.3V power supplies. Modern logic chips use 1.2V, 1.0V, 0.9V, etc.
5	Do we need to add the open circuit empty circles to our circuit diagrams when we simplify?	You don't have to add them if you state that you turn off the current source as a step of superposition, but it helps to show there was a current source in the original circuit so the superposition steps are clearer.
6	why does the 20 ohm resisor matter if the current will flow through the path of least resistance	The current won't *only* flow through the path of least resistance. It will just flow *more* through the path of least resistance. Meaning that more of the current will flow through the 4 Ohm than the 20 Ohm, but some current will still flow through the 20 Ohm.
7	How do you decide which resistor value goes in numerator of voltage divider equation?	I believe we typically use the resistor that is closest to ground
8	how are the 5 and 4ohm resistors parallel?	Since they connect the same 2 nodes (u2 and gnd), they are in parallel.
9	For part 1, how was the first step resistor’s in series yet in part 2 resistors in the same positions are parallel?	Very good observation. There is no guarantee they will be the same between the 2 versions. It all depends on our sources what happens after we "remove" them for superposition.
10	Why aren't the 5 ohm and 4 ohm resistors in series?	They are in parallel since they share both nodes.
11	can you explain why they’re in parallel and not series please, the 5 and 4 ohm resisitors	live answered
12	how were the 5 ohm and 4 ohm not in series? aren’t the connected by the same wire?	live answered
13	How did you know to make the new resister vertical instead of horizontal for the first simplification?	Vertical and horizontal in the diagram actually do not matter, as long as it's connected to the correct two nodes.
14	why is it 2.2 ohms? arent the resistors in series? shouldnt it be 9 ohms?	live answered
15	are we able to combine the 12ohm resistor and the 8ohm resistor in parallel	Nope since they don't share the same two nodes.
16	Why is it that when we removed the current source, that side became an open circuit, but removing the voltage source doesn’t do that?	Removing current source means turning the current to 0, so effectively an open circuit. Removing voltage source means turning the voltage to 0, effectively a short circuit.
17	Does the direction of the Current source matter?	yes, since it defines the direction of the current through the wire
18	Why do the resistors not affect u'?	When she puts the 12Ohm and 2.2Ohm in series into one resistors, then that resistors in parallel with the 8Ohm doesn't change what u' is connected to, so the behavior won't change.
19	Why was the prof able to move u to u'? Isn't it in a different node?	It is a different node. So we haven't completely solved u yet
20	How did she know that it is negative?	sign convention. The current flows into the neagtive end
21	why is it negative 5 A	live answered
22	isn’t it 25.5	Yes 25.5
23	why is the 5A negative?	live answered
24	why is I_s negative 5 amps?	live answered
25	Is R2 always the resistor that's connected to ground?	I assume you are refering to the voltage divider. So not necessarily. If we are interested in the voltage across the other resistor, then that one can be on the numerator.
26	why couldnt we rewrite the 8 ohm resistor with the 12 ohm resistor into Requ instead of finding U prime	8 ohm and 12 ohm are neither in parallel or in series.
27	Where did the 8 ohm resistor go in the final diagram?	We can "ignore" it since we've already solved for u'
28	why do we need u prime	We're denoting a separate node from the original u2 node
29	what was the relationship that she used for the formula to get u2 again? as in why is she multiplying by -25.6	That's a voltage divider formula.
30	if the 5 ohm and 4 ohm are in parallel here, why was a similar thing in series in the current solving part (12 ohms and 8 ohms to 20 ohms)?	Note that in part (1), the 12 Ohm and 8 Ohm do not connect to the same nodes. 12Ohm connectes to u1 and the upper right node. 8Ohm connects to the upper right node and GND. so these are in series.
31	So when using superposition why do we replace current sources with open circuits and voltage sources with short circuits?	When we 'turn off' a current source, we turn its current to 0, so it's effectively an open circuit. When we 'turn off' a voltage source, we turn its voltage to 0, so effectively a short circuit.
32	I’m still not clear on why you can combine the 12 and 2.2 ohms resistors in parallel but not the 12 and 8 ohms resistors in series	The 12 and 2.2 Ohms were combined in series, not in parallel. We don't want to combine 12 Ohm and 8 Ohm at the end because we've already solve for u', so we don't need to simplify any further there.
33	why are we ignoring 8 ohm when we are doing voltage divider for u2?	The 8 ohm one does not affect the voltage divider voltages, since it is directly connected to u' (in parallel with the entire voltage divider).
34	How do you know which side is positive and which side is negative when labelling the resistor next to u'?	For voltage labelling, its arbitrary. As long as we're consistent between all the circuits we draw and follow PSC.
35	So is the actual voltage for Umid 16 bc superposition?	*20
36	how did you get u2? and why did we solve for u’?	u' is an intermediate step to solve u2 by the voltage divider formula. We can also solve for u2 without u' using NVA.

37	what does having a negative voltage mean	A negative voltage means lower than the ground node voltage we defined. Think of being below sea level. You're still on land, but just lower relative this "0 level".
38	can you do superposition with more than 2 sources?	Yes, we can do it for any numbers of sources, just turn off all but one each time.
39	can u label u1 and u2 on the SAME diagram?	
40	when she was finding u2 she considered u prime to be vs right	Yes
41	If we label elements with different signs, will we get a different result for u2?	yes. please keep the labelling consistent between the circuit versions when you do superposition.
42	why do we take off the wire on the left of u2 when setting the equivalence of 5ohm and 4ohm resistors in step 2 again? wouldn't it still be connected to ground node after setting equivalence?	I believe by equivalent 5 ohm and 4 ohm in parallel, we just remove that wire since that's the wire connected to one of the resistors.
43	do laptop trackpads have capacitive touch too?	Many modern ones do, yes
44	is the touch lab a resistive or capacitive touchscreen?	The first couple labs are resistive. One of the last ones will be capacitive
45	Do we need to know how to derive equations on exams?	I would say this question does not have a general answer. Though you don't have to prove any equations we already covered in lecture/discussion/homework/lab before using them unless specifically asked by the problem. If you have a specific equation whose derivation you want to know is required or not, you are welcome to post a question on Piazza.
46	Why isn't Is in the opposite direction?	live answered
47	dont electrons move from - to + not the other way around?	electrons move from + to - inside the voltage source, like positive charges move from - to + inside a voltage source.
48	why is the current flow direction opposite to the passive sign convention?	live answered
49	what is the current flowing against the passive sign convention?	why^**
50	Where does the minus charges come from (what's their starting point)?	live answered
51	So the capacitor acts like an open circuit until a sufficient voltage potential is reached?	Yes for our discussion just now. But if we have a changing voltage (AC voltage), the capacitor will have a different behavior from the open circuit.
52	Are capacitors what is used to charge up a defribillator before they zap your heart?	they are certainly one part of it
53	So from teh animation, as electrons build up on the bottom plate, the positive charges move away from the top plate?	positive charges also build up on the top plate, or you can say electrons move away from the top plate
54	is V not a scalar constant	The voltage across a capacitor can change. It depends on the charges Q built up on the capacitor. We won't be doing too much crazy stuff with it in this class.
55	why can we say that capacitance is a constant but voltage isn't	Capacitance is the physical property of the capacitor, so typically it's a constant once the capacitor is manufactured (we can also have tunable capacitors though). We can control the voltage more easily.
56	what happens when after all of the electrons build up on the bottom plate	The charges stop building up once the voltage across the cap equalizes with whatever is charging it, e.g. the voltage source. After that, the current stops, and the cap holds its charge / voltage.
57	where is Q=CV coming from when we're using it as the basis for all these other derivations	The capacitance is defined by C = Q/V. That's a definition.
58	Why is q lowercase in dq?	live answered
59	Why the integration bound is from 0 to Q? Why not -Q to Q?	We start with no charge on the capacitor = 0V. We end with some amount of charge Q.
60	Do we have to learn these derivations? Can we be asked to derive all this in an exam?	These equations and derivations are in-scope. But if we don't ask you to derive something, you can jump straight to the equation.
61	So can we just use the energy formula or do we have to derive it on tests?	You don't have to derive that equation in exam or homework unless explicitly asked for.
62	Will we be given the values for these constants on the exam?	Yes. But generally since you don't have calculators in exam, you likely will not use that value in any calculations.
63	is the E in the second picture the epsilon she is talking about?	No, the E in the 2nd picture is actually the voltage, from physics. Don't worry about it, that particular label is confusing.
64	is capacitance the amount of charge that can be stored? and what does permitivity mean for a material?	Capacitance is the amount of charge stored divided by the voltage across the capacitor (C = Q/V). Permitivity describes how the material reacts when there is an external electrical field. Higher permitivity means the material is more able to compensate for external electrical field so its internal electrical field is weaker. You will definitely see more in physics or EM wave courses.
65	Why is current flowing negative to positive on the voltage source?	Its the same Ic as flowing into the cap, so we're using the same direction. We're just accepting -Is = Ic.
66	shouldn't vs = -vc b/c of KCL?	KCL defines current relationships, not voltages. KVL does give us Vs = Vc.
67	how come close s1 s2 is supposed to mean close s1 open s2!	In this circuit, we only wanted one of the switches closed at a time. The other is left open.
68	at t=inf, does that mean that voltage is infinite?	For this current source example, yes
69	shouldn't Vc(t) be adding Vc(0) not subtracting it?	Yes it's adding Vc(0)
70	wouldnt the intercept be negative?	The equation should have +V0

71	are the two plates of the capacitor different at all?	From an ideal perspective, they can be identical. In real world manufacturing, there may be some tricks to it that forces us to actually have distinct +/- . In lab, we will tell you if you need to worry about that.
72	What if d and E are not the same for both capacitors	That is just an example, but the Ceq = C1 + C2 equation works in general cases if the two capacitors are in parallel.