#	Question	Answer(s)
1	is the opamp essentially working like a voltage source in the unity gain buffer	That's in the right track. We model the op amp as having a dependent voltage source connected to its output. The feedback loop in the unity gain buffer sets the dependent voltage source equal to the input.
2	What's the difference between inverting and non inverting	Inverting means the v_out vs v_in formula has a negative sign before v_in. For example v_out = -v_in is an inverting buffer, and v_out = v_in is a non-inverting buffer.
3	the op amp isn't actually modifying anything here right, it is just isolating vdac as vout without Idac (current)	yes!
4	how does vout being v- help "correct" the circuit in a negative feedback?	The feedback loop tries to make vout = A(v+ - v-) and vout = v- = v+ work. So if vout is momentarily not v+, the loop will cause vout to change or correct itself to get closer to what we expect.
5	what's the issue with the first op amp example with v- grounded again?	If we ground v-, then that ground sets the voltage at v-. We don't want that.
6	Why does A go to infinity?	It's a property of an ideal op-amp (A is very large, going to infinity).
7	is Vout the voltage of the voltage source or the voltage after it has dropped across Rdac	Since the + terminal of the op-amp does not take in any current, there will be no voltage drop on Rdac.
8	How does the op-amp isolate the 2 circuits since Vin is the resistors' voltage	No current flows into the inputs of the op-amp, so there is no voltage drop across the resistor.
9	what about the rail voltages? aren't they supposed to be V_out depending upon how the two values of V_in and V_out?	Since we have a negative feedback here, the V_out will not be the two rail voltages, unlike in a comparator where we don't have any feedback.
10	Why do we have R_dac if there is no current flowing into the op-amp?	R_dac is part of the DAC model, so it exists no matter what we connect to the other side.
11	why do we have Rdac if it doesn't affect Vin	Its part of the DAC model, so we can't change / remove it. We have to build and design circuits around it. Fortunately, the op-amp help us ignore Rdac
12	How does the op-amp deliver voltage but not current? LIke how does it work again	The op-amp does deliver current. The output is a voltage source, so it can supply any current desired.
13	Is the first resistor's voltage 0, because the op-amp has 0 current?	Yes
14	can you reiterate the difference between A and f	live answered
15	Why is A so unstable that we need to use f to replace its function?	A can be dependent on temperature and other noise. I think
16	Do we consider the op amps, ideal and that's why we approach A to infinity?	Yes, we always consider ideal op-amps unless otherwise noted.
17	so f = 1/3?	yes, that will be the goal
18	Why connecting the negative terminal of op amp to ground would not work?	We need vout and v- to be able to move freely so the loop can change. Connecting it to ground forces it to be just 0V, which will not help us
19	just to confirm, the ~ means that the value of voltage (V_in) in this case is not constant and changes, right? And has it got anything to do with AC?	Yes it means V_in can be varying vs time. Any time varying voltage can be called an AC voltage. But in this course we will not distinguish between AC and DC specifically. Just consider it as a regular voltage souce.
20	so A is always a part of the gain in an op amp but having f as a part of the gain in a neg feedback system with an op amp stabilizes the gain so it can correct vout if it isn't equal to V+?	*correct v- if it isn't equal to v+, but otherwise, yup!
21	Does adding the 2 resistors have any loading effects on the current going through the speaker?	Great question! It won't because vout is connected to the output of the op-amp, which is connected to a voltage source.
22	If the op-amp has 0 current going into them, then how does an op-amp have voltage?	We also have power rails to the op-amp. There will be currents inputing from the power rails so we don't break the energy conservation rule.

23	What flows into the op amp if there is no current going in?	Nothing flows into the V+ and V- terminals. Those terminals just read voltage. Remember that our op amp also has a VDD and VSS. those are the things actually supplying power to Vout, but we simplify the modelling to just a single voltage source.
24	does any current flow through R1 and R2 though?	Yes, the current will be vout/(R1 + R2).
25	Vout is still restricted by vdd and vss right? even when amplified?	Yes, we cannot exceed Vdd and Vss.
26	The line below the first Vout equation should also have Vout on the left right?	yes, that's a typo
27	Can you repeat what is non inverting?	live answered
28	when would we want a inverting op amp amplifier>	Inverting a signal can be sometimes useful. For example for a negative feedback control, if some signal increases, we want to somehow control it to make it decrease, and an inverting amplifier will give you the correct control direction.
29	what situations would we even want positive feedback in	kaboom
30	If current isn't flowing through the orange node that we can use a voltage divider, how does V- change thus making it a negative feedback system?	live answered
31	I'm still a bit confused about gain of the system vs gain of the op amp	The op-amp gain is A, which is intrinsic to the opamp. The gain of the system is the op-amp + resistors in negative feedback, which we calculated as 1/f (or R1 + R2 / R2 for the non-inverting op-amp)
32	why is it 2k ohms, would 20 and 10 work just as well?	yup!
33	I remember there being a voltage dependent voltage source somewhere in the circuit? Where did that go?	its on the inside of the comparator
34	what if we connected the negative to ground, that would be infinite gain so it would rail at V_dd, right?	Yes, that op-amp will become a comparator.
35	If V+ and V- are equal, then wouldn't it be A(V+-V-)=A(0)=0= Vout?	Remember A is infinite, so we have inf * 0, which can be a finite value.
36	How do we check for negative feedback?	Assume vout increases a little bit, then check whether (V+ - V-) is increasing or decreasing. If it's decreasing, then it's a negative feedback.
37	what is the goal agaian?	live answered
38	Why is V2 = V- - Vout?	the left node of R2 has node voltage V-, and the right node of R2 has node voltage Vout
39	what does it mean for the output voltage to be negative, how can we use this to benefit us	Inverting a signal can be sometimes useful. For example for a negative feedback control, if some signal increases, we want to somehow control it to make it decrease, and an inverting amplifier will give you the correct control direction.
40	For the non-inverting op-amp, why was v- not equal to v+ even though it was negative feedback?	v- = v+ is indeed satisfied
41	how did she change both v- to 0?	This comes from the golden rule 2. v+ = 0, so v- = 0
42	How does V- goes up when Vout goes up?	We have a voltage divider formed by R1 and R2, so V- will go the same direction as Vout
43	when we're checking if the circuit uses neg feedback do we always assumbe if we inc V- it's still less than V+	It doesn't matter. We want to check the direction of change of (V+ - V-), not the absolute value.
44	why do we want a negative 3? what does that mean?	We're multiplying the input by -3. So if we have 1V in, then we want -3V out.
45	I thought it's just the difference between v+ and v- is 0, can we just assume that both are 0?	V+ is connected to ground, so V+ = 0. then V- must also be 0.
46	is Vin Vs in this diagram?	yes
47	So it's just a rearrangement of elements?	Yes

48	when would we like to use an inverting op amp and not a non inverting one like in the speaker example? like a real example	live answered
49	Can the professor explain one more time how we know there is negative feedback?	We can assume v_out increases a little bit, then check whether (V+ - V-) is increasing or decreasing. If it's decreasing then it's a negative feedback.
50	what is an adder cirxuit	It's something outputing the sum of the inputs. For example we input two voltages V1 and V2 then the output will be V1+V2. We can actually achieve this by an op-amp circuit.
51	why does vin = vsensor with no connection	vin is an open circuit node, so should be 0 V with no connection.
52	why is vin without connection equal to vsensor? arent we assuming it would be an open circuit?	Yes you are right. Without connection Vin will be an open-circuit.
53	How does green multiply it by -3 without a voltage divider	This is what the inverting amplifier does. The voltage divider only gives us ratios between 0 < ratio < 1. Inverting amp gives us values < 0.
54	V_s = V_sensor, right?	Yes in this case with a unity gain buffer.
55	Do we need Rs anymore since no current flows through it?	live answered
56	Wait why do we need the unity gain buffer?	If we don't put it there, then inverting amplifier will draw current from Vs and change the voltage seen.
57	isn't it 4 times gain?	live answered
58	what was the purpose of the z equation	We were showing an example of why we would use the inverting amplifier, to do some math.
59	windmill shape	
60	In the previous example, if we didn't have the resistors that goes into the negative terminal of the inverting amplifier, would we still need the unity gain buffer?	If we don't have those resistors, that will not be an inverting amplifier.