1. Choose 3-4 technologies, figures, or trends that stood out to you. Explain why in a few sentences.

The first thing that stood out to me is the number of private investors outnumber the number of corporate and public investors. I was previously under the impression that corporate investment into quantum computing was the norm since they have the most assets to invest. The second thing is number of tech players investing into superconducting qubits. Josephson junctions are nice and all, but they do have scaling up and coherence issues, which is why photonics lacking investment from big players is surprising. The last thing is amount of quantum sensing startups altogether. Quantum sensing is one of the few quantum based technologies with a lot of real world applications, so it's surprising to see the low number of startups focusing on it.

2. Make a list of any terms or technologies that you found confusing or hard to understand. Choose 3 of these and do a quick search on them until you think you have a better understanding. For each of these 3 items, write a short glossary entry explaining them, and list any references you used.

Value chain, noisy intermediate scale quantum (NISQ), variational quantum algorithms (VQA), quantum phase estimation (QPE), maximum likelihood quantum amplitude estimation (MLQAE), h-index

Noisy intermediate scale quantum: what the current paradigm of quantum computing is, systems with up to 1,000 qubits that are not yet fault tolerant enough for any real utility
https://en.wikipedia.org/wiki/Noisy_intermediate-scale_quantum_era
Variational quantum algorithms: algorithms that use classical optimizers to train a quantum circuit
https://www.nature.com/articles/s42254-021-00348-9
Quantum phase estimation: a quantum algorithms that gets the value of a unitary vector after applying a linear transformation to it
https://en.wikipedia.org/wiki/Quantum_phase_estimation_algorithm

3. What observations can you make about public vs. private investment in quantum technologies around the world? What respective roles do you think government, industry, and academia should play in quantum technology development?

It seems that private investment outweighs public investment a lot. This seems to be due to the lack of public knowledge surrounding as well as the amount of hype that the tech sector has about quantum based technologies, evidenced by the great amounts of venture capital funding into startups that are developing quantum based technologies. Government, industry, and academia should have a collaborative approach quantum technologies, since academia would allow for great workforce development, but that cannot be done without funding from both government and industry. Government should push for more quantum development with legislation and policy incentives since achieving utility scale quantum computing is paramount to something like the space race back in the Cold War era, both a public statement to the strength of a nation and a legitimate security concern. Industry should do as industry does and innovate on the cutting edge, often moving faster than government can due to the lack of bureaucratic bloat and a strict profit incentive.