1: Which cloud deployment model would you choose for each of the following? Why? Please justify your answer briefly (within 5 sentences).

1. A hospital that deals with sensitive medical records. **Private cloud. It would be expensive, but HIPAA (in the US) requires absolute patient privacy, so the security afforded is not substitutable.**
2. A newspaper that wants to digitize its archives. **Public cloud. There is no business reason for the security of private and no community to share the data with.**
3. A defense contractor which has about 50% confidential data and the remaining 50% of non-sensitive non-secret data. **Hybrid cloud. A private cloud must be used for the private data, and a community cloud should be used to share the remaining data with other contractors and the military.**
4. A national association of astronomy departments which collaborate in processing data from Radio Telescopes. **Community cloud. Not everyone has business accessing the cloud and using its resources, but the cloud does not need to be secure (thus private).**

2: Acme Inc. wants to build a new data center. It has the following choices:

(a) State A, which has year-long warm weather with very hot and long summers and 18 cents/kWh electricity.

(b) State B, which has mild weather and 8 cents/kWh electricity,

With all other factors (land price, tax breaks) being equal, which of the above will be a good choice for setting up the data center and why? **State B would be preferable, not only because it is cheaper, but also because significant heat has a non-negligible effect on computers.**

3: Consider the following scenarios: would using the cloud make business sense for any of them? Please justify your answer for each of the scenarios with a brief explanation. The storage cloud service provider in this case charges $1 per GB of data storage per month, and $0.05/GB of data transfer out of the cloud (incoming transfers are free). The cost of storing data locally is $5/GB/month. System Administrator salary is $20/hour.

1. A company which produces streaming data at a rate of 1 GB/hour, and needs to process data at the end of each week. **Monthly: 720$ weekly in cloud storage + 3200$ for the sysadmin (assuming 9-5, M-F schedule, and 30-day month that starts Saturday and ends Sunday) + 36$ for processing; 3600$ in storage for local. Better to do local.**
2. A company which produces medical records infrequently (1GB/day), but needs to process the data at the end of each day. **30$ in cloud storage + 3200$ for sysadmin + 1.50$ for processing; 150$ in storage for local. Better to do local.**

5 (MS): Give brief (1 paragraph) justifications on why using the cloud may be or may not be a good idea for each of the following cases:

1. A hospital with patient records.
   1. **May or may not be a good idea. If records must be kept electronically, and they are a very large hospital, then a secure private cloud (which must be private due to HIPAA) would be needed. If they are not a large enough hospital, then as the answer to question 3.b shows, then it would not be economical to store or process patient records offsite, especially since private clouds are more expensive.**
2. A bank with transactions and non-transactional data about clients.
   1. **Usually a good idea. Transactions grow at a rate far more frequent than medical records and it is an expected cost of business to store this transactional data. Data like this is apparently private, which increases the cost, but it is a necessary cost of the business to store transactions to keep track for reasons both business (fraud prevention) and legal (the FBI and IRS track buying patterns).**
3. A university with non-proprietary research on non-human subjects.
   1. **Probably not a good idea. No privacy is required because no people are involved, and there is no business reason to keep the information private. However, this factor only determines what kind of cloud is needed. I don't know much about medical (or psychological) research, but I don't think this produces very large amounts of data per project. If the university is primarily a research university, has many years of research, and is large, then it would make sense to cloud the data; otherwise it wouldn't.**
4. A startup that creates a mobile app with the potential to support a growing number of users.
   1. **Definitely a good idea. If the startup grows, then it will get to a point where doing all its data processing in-house will become too expensive, and the point of cloud is scalability. This is especially true if theirs is a sort of app that loses any ability to be lightweight if all its architecture is hosted on the phone, like streaming or map-based applications; users prefer lightweight apps.**