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Midterm - INTD290

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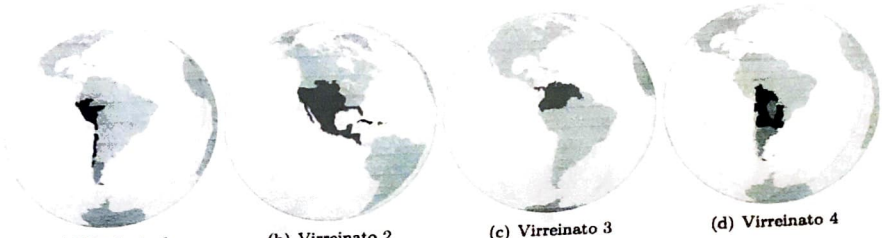
1 How to Submit this Midterm

1. Complete your work on this midterm.
2. Scan it into PDF form using a smartphone app, scanner, or digital picture
3. Alternatively you can type up your answers in a separate file, but it still must be a PDF
4. Submit it using the link on Moodle

2 Maps of The New World



(a) Virreinato 1 (b) Virreinato 2 (c) Virreinato 3 (d) Virreinato 4

Figure 1: There were up to four *virreinatos* during the Spanish colonial period of Latin American history.

1. In which of the four *virreinatos* of the Spanish colonial empire (shown in Fig. 1) was the *tle huitzilin* classified by the indigenous? Virreinato 2 because Aztecs resided in modern Mexico city.
2. Which of the four *virreinatos* excelled at the exportation of rum? Nueva Granada, Viceroyalty 3.
3. Which of the four *virreinatos* was characterized by an indigenous empire that mastered agriculture in the Andean mountains? The Incans did it best, and they were in Peru, so Virrierdto 1.
4. The low-latitude aurora of 1789 was observed in *which cities?* In which of the four virreinatos are these cities? List some other countries in which corresponding observations were made. Ciudad de Mexico
5. List some of the locations explored by La Condamine and his Latin American collegues, and cite the virreinato or virreinatos they explored together. He was a French explorer who went to Quito, Ecuador, and Lima, Peru. VR 1 and probaby 3 when in ju
6. The Expedición Botánica of José Celestino Mutis took place in which virreinato? It was in Nueva Granada, so VR 3.
7. José Celestino Mutis took place in which virreinato? Mutis was the inaugural chair of the department of mathematics at the *Colegio del Rosario*. In which city is this? A colombian college in Bogota.
8. In which country is the Pierre Auger Observatory located? In which virreinato would this country have been in the 18th century? It is in Argentina, which would be Virreinato 1.

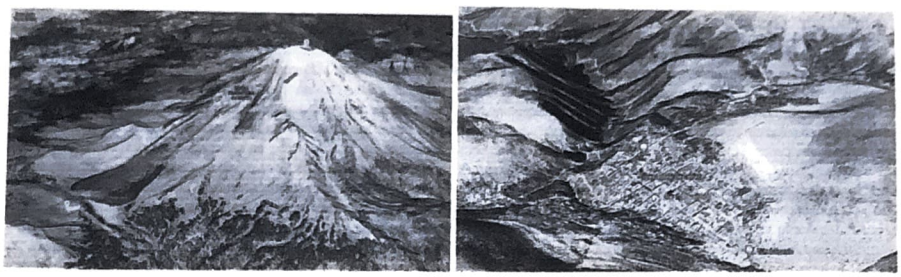


Figure 2: (Left) A physics detector near Pico de Orizaba in Mexico. (Right) A town in central Mexico.

Figure 3: A historical location in Latin America known for driving a particular economic sector.

3 Asynchronous Activity Review I

1. What is the physics detector shown in Fig. 2 (left)? Explain in basic terms the purpose of this detector and how it works. The detector is HAWC. The detector has multiple bodies of water set up along with detectors to discover and sense radiation from Gamma Rays. The purpose is to make a galactic map to find where the High Energy Particles came from.

2. What is the significance of Mexican cities as pictured in Fig. 2 (right), in the context of the development of colleges and the scientific community in 18th century Mexico?
Many scholars gathered in cities to find like-minded individuals that would be willing to work together (and certainly not rat each other out to the church at the time) to make important discoveries and spread their works, often in the form of pamphlets!

3. What city is being shown in Fig. 3? In which country is it located, and what was the historical significance of this city for international trade? Who controlled it? From where the commodity produced here originate, and how was it shipped to Europe and Africa?
Pari Urqu is a mountain peak in Potosi, Bolivia. Many Bolivian Intellectuals gathered there in history. However, Potosi is mainly revered in history for its massive silver mining industry. It was a very important mining town. The Spaniards had a major control over the region. Most of the silver came from the mountain Cerro Rico. They utilised the patio process. It was located in the Viceroyalty of Peru.

4 Asynchronous Activity Review II

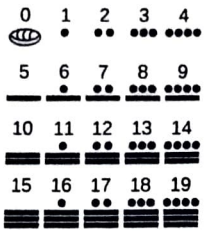
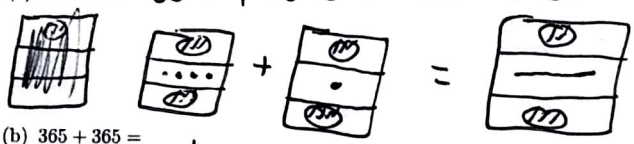


Figure 4: A list of the numerical digits used by the Maya.

1. Work out the following addition problems *using the Mayan system.*

(a) $80 + 20 =$ $80 = 4*20+0*1$ $20 = 1*20+0*1$ $100 = 5*20^1+0*20^0$



(b) $365 + 365 =$

$365 = 18*20^1+5*20^0$

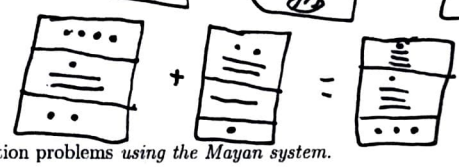
330 $730 = 1*20^2+16*20^1+10*20^0$

(c) $1024 + 512 =$

$1024 = 2*20^2+11*20^1+4*20^0$

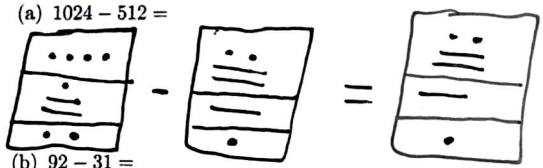
$512 = 1*20^2+5*20^1+12*20^0$

$1536 = 3*400+16*20+16*1$



2. Work out the following subtraction problems *using the Mayan system.*

(a) $1024 - 512 =$



(b) $92 - 31 =$

$92 = 4*20+12*20^0$

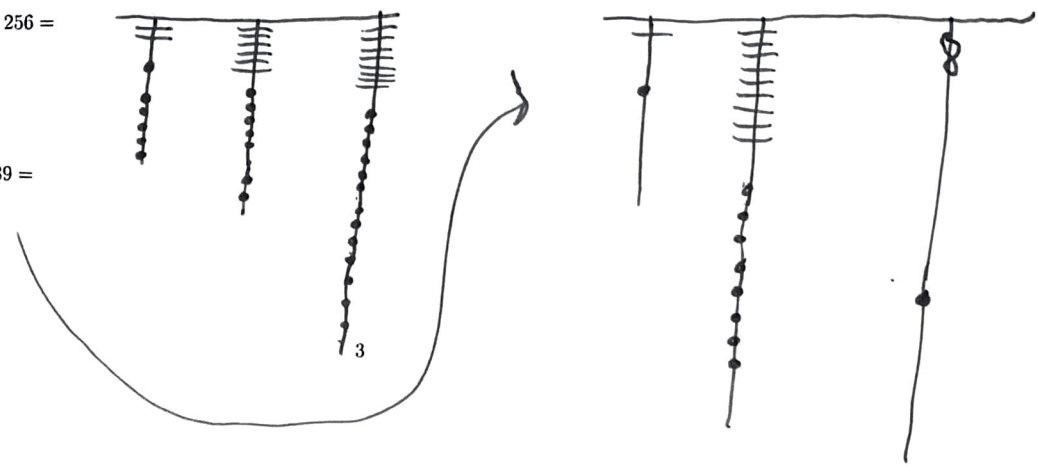
$31 = 1*20+11*20^0$

$61 = 3*20+1*1$

3. Work out the following addition problems *using the Incan quipu:*

(a) $512 + 256 =$

(b) $11 + 89 =$



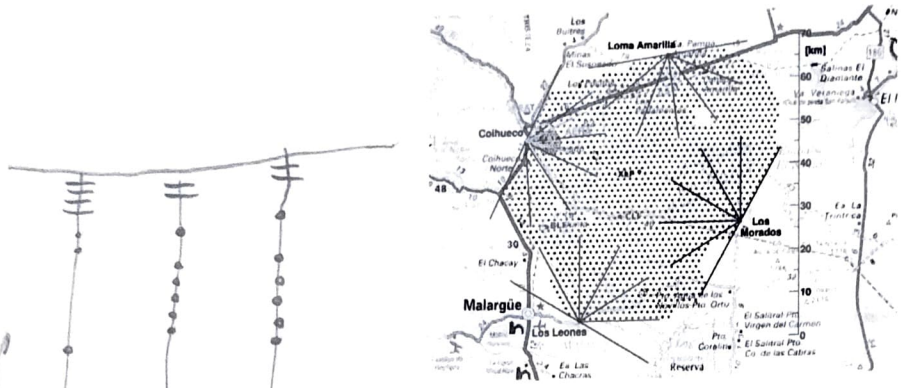


Figure 5: A physics detector near Malargüe, Argentina.

1024 - 512 = 512

4. Work out the following subtraction problems *using the Incan quipu:*

   (a) $365 - 67 =$

Not enough room, and eraser doesn't work.

   (b) $1024 - 512 =$

365 - 67 = 298

5. Suppose you have six terrace plots in the Andean mountains to use to survive. You and your cohort of fellow Incans decide to grow potatoes and quinoa. Quinoa actually do better at higher altitudes that potatoes. So the plan is to use the two lowest terraces for potatoes, and the upper four for quinoa. Each terrace is 30 meters by 5 meters. A potato plant requires a 0.2 meter by 0.2 meter patch, and a quinoa plant requires a 0.3 meter by 0.3 meter patch. How many potato plants and how many quinoa plants can you plant? Store the results in a diagram of quipu knot system.

750 potatos and about 6500 quinoa.

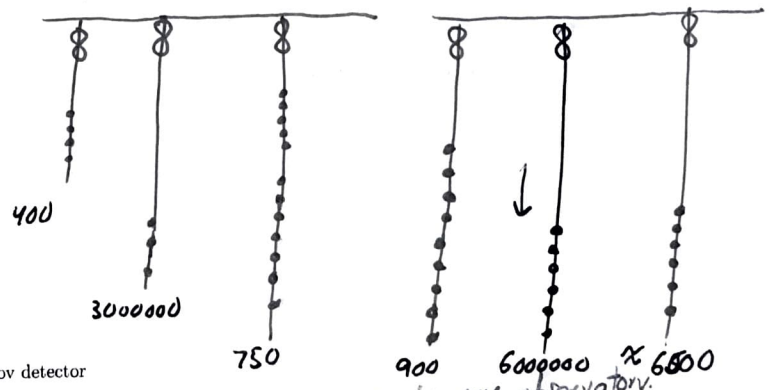
Each terrace is $1500000\ cm^2$

$Pot8 = 400\ cm^2$ (12) Total Pot8 = $3000000\ cm^2$

$Qui = 900\ cm^2$ (4) Total Qui = $6000000\ cm^2$

Potato Data

Quinoa



5 Connection to Physics

1. In Fig. 5, what physics detector is shown?
   - A: The Large Hadron Collider
   - B: The IceCube Neutrino detector
   - C: The Pierre Auger Observatory
   - D: The High Altitude Water Cherenkov detector

2. What is the purpose of the physics project shown in Fig. 5?
   - ~~A~~: To collide protons and nuclei to probe sub-atomic physics
   - B: To detect signals from neutrinos that originate outside the solar system
   - C: To detect cosmic rays that originate outside the solar system
   - D: To detect gamma rays from space

It's a cosmic ray observatory. However, B, C, and D can all be right from their correlation to Cosmic Rays.

3. What is a gamma ray?
   - A: A photon of light
   - B: A proton or nucleus from deep space
   - C: A portion of the aurora borealis
   - D: An ion floating in the atmosphere
4. What is located at each black dot in Fig. 5?
   - A: A water tank designed to record Cherenkov radiation
   - B: A radio receiver designed to record radio pulses
   - C: An optical sensor designed to record visible light
   - D: A telescope designed to detect infrared radiation

6 Vocabulary

1. What is the meaning of the term *rationalism*?
   - A: The idea that reason rather than experience is the foundation of certainty in knowledge
   - B: Encapsulating the idea of *I think, therefore I am.*
   - C: Using scientific instruments
   - D: Relying on measurements and sensory experience to discover the truth
2. What is the meaning of the *Nahuatl* term *abuizotl*?
   - A: A horse
   - B: A hummingbird
   - C: An otter
   - D: An alligator

   Water beast sounds alligator-like to me
3. What is the meaning of the *Nahuatl* term *tomatl*?
   - A: Smoked fish
   - B: Smoked chili
   - C: An herb to help digestion
   - D: A tomato
4. What is *cinchona*?
   - A: An herb used to treat indigestion
   - B: A shrub or tree used to create quinine
   - C: A flower used in religious rituals of the *Mexica* people
   - D: A plant that can form a treatment for syphilis
5. Define the word *torpor*, as it pertains to animal behavior.
   - A: The ability hover in midair during flight using rapid wingbeats
   - B: Lowering internal body temperature and metabolism to levels that render the individual immobile and in a hibernating state
   - C: The ability to break open the shells of mollusks using tools
   - D: The ability to distinguish complex sounds in songs or calls
6. Who were the *Jesuits*?
   - A: Formally known as the Order of Preachers, this is a Catholic order founded by Saint Dominic
   - B: Formally known as the Order of Friars Minor, this is a Catholic order founded by Saint Francis
   - C: Formally known as *Los Amigos del País*, these were mining officials who formed guids to further economic interests of their region
   - D: Formally known as the Society of Jesus, this is a Catholic order founded by Saint Ignatius of Loyola

7 Free Response Section

1. **Kepler's Laws, and Newtonian Physics** Discuss the varying levels of acceptance within scientific and academic communities in Nueva Granada and Perú in the late 18th century.

The Jesuits were widely accepting of new advancements in Physics such as Newtonian Physics and Kepler Laws, while the Dominicans valued scholasticism where old ideals were kept important and new and seemingly iconoclastic views that the Jesuits accepted, were vehemently rejected.

2. **The aurora of 1789** Discuss the significance of the aurora borealis in 1789 that was visible from Mexico City. List several researchers who made observations of this aurora and other auroras, and explain what they found.

This was a majorly significant event because this allowed people to discover that the aurora was caused by the Earth's magnetic field. It was never observed this low, and this led to the theory that the auroras emerge in a circular pattern from the Northernmost parts of the Earth. Some observers of the event were José Antonio Alzate and Antonio León y Gama.

3. **Herbal medicine in the 16th century** Give several examples of treatments for various ailments in the body used by Europeans and indigenous Latin Americans in the 16th century. Explain the theory of the four humors and why this influenced the European treatments but not the indigenous ones.

An important example is the difference in the cure for diarrhea or dysentery in extreme cases. The Indigenous population had an actual cure for it that consisted of drinking water w/ tzipipatli w/ tortilla pieces in it. In Europe the treatment was drinking horse manure (nasty) mixed with wine. Another example is the cure for a broken bone. Indigenous treatment was reset the bone, and then cut a root and splint. If there was swelling, they pricked it and put a root in. In Europe, they put goat manure and wine on it. The reason why so much manure was to try to balance the four humours w/ more brown/dark things.

4. **The Inquisition, the Catholic Church, and Scientific Traditions** Discuss several examples of the following: (a) Catholic censorship of knowledge flowing from Europe to Latin America (b) Catholic censorship of knowledge flowing from Latin America to Europe (c) contributions to Latin American science by Catholic scholars and explorers (d) knowledge that was recorded or translated from indigenous sources by Catholic priests, monks, or nuns.

The Catholic Censorship of knowledge flowing from Europe to Latin America was a prominent issue at the time. The main reason for this was to prevent a revolution ~~and cast~~ costing the Spanish Crown their colonies in the New World. Some techniques utilised were that of having people from the Church go to students' houses and ask them about what they were learning. Also, they did some searches to see if banned books were possessed by people. Flowing from Latin America to Europe was a different situation, where the church monitored what was being published by scholars, and shutting them down if necessary. Some awesome contributitions from Catholic Latin American scholars came from people like José Antonio de Alzate who was actually a priest and played a major part in spreading of knowledge and ~~[illegible]~~ took part in determining the origins of the Aurora Borealis. Another important Catholic Latin American scientist is Antonio de León y Gama. He was an eminent astronomer who made many important observervations at the time.