Samantha Salazar

45/50

Nice job

Midterm - INTD290

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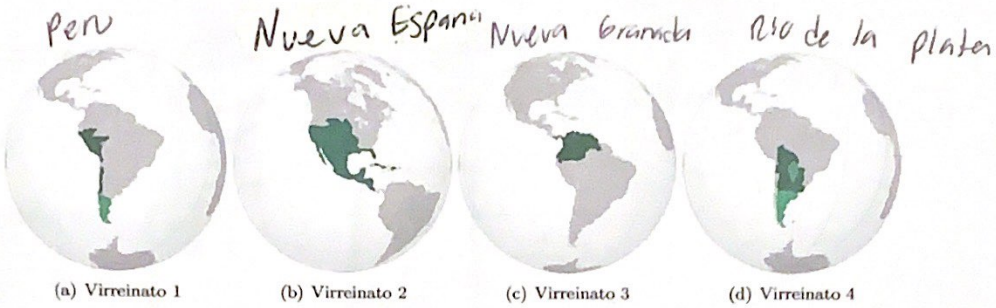
February 4, 2021

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? (B) ✓
2. Which of the four *virreinatos* excelled at the exportation of rum? (C) ✓
3. Which of the four *virreinatos* was characterized by an indigeneous empire that mastered agriculture in the Andean mountains? (A) ✓
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. (B) ✓ (A) (C) (-1/2) but which cities?
5. List some of the locations explored by La Condamine and his Latin American collegues, and cite the virreinato or virreinatos they explored together. (A) (C) ✓
6. The Expedición Botánica of José Celestino Mutis took place in which virreinato? (C) ✓
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? (C) ✓ (-1/2) city?
8. In which country is the Pierre Auger Observatory located? In which virreinato would this country have been in the 18th century? (D) ✓

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 a high energy cosmic ray in HAWC observatory in Pico de orizaba. It is located in the highest mountain in Mexico so it's protected. It contains 300 water tanks that are packed tightly together. Cherenkov radiation travels through the water and gamma rays travel to create a positron-electron pair ✓ Nice!

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? These two cities were hubs for mining silver by hand starting in the 1590s all the way to the 1700s. The discovery of silver in these mines as well as mining techniques was the catalyst for private scientific development and the creation of colleges (1700s-1800s) which taught modern science- ✓ mining guilds

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?
The city shown is potosí which is in Bolivia. Potosí was very famous for mining. The wealth and materials from this mine were exported out which made the city popular for trade. The crown controlled potosí. The silver was mined by hand, collected, and then shipped to other parts of the world. ✓

4 Asynchronous Activity Review II

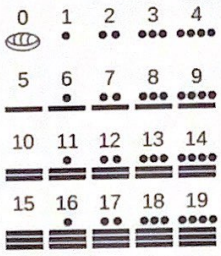
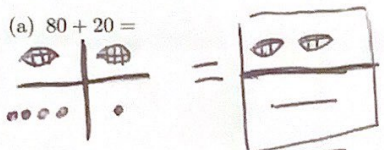


Figure 4: A list of the numerical digits used by the Maya.

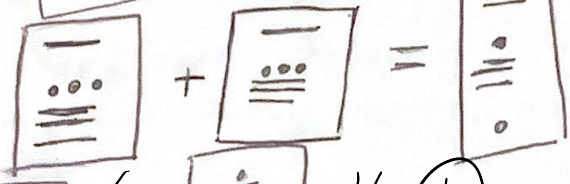
1. Work out the following addition problems *using the Mayan system.*

(a) $80 + 20 =$



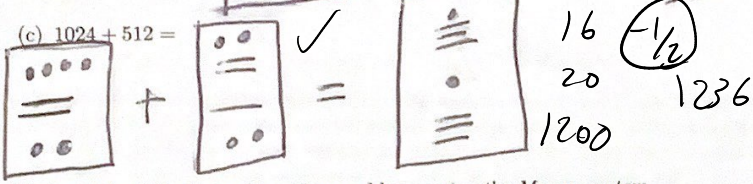
only one stell is required

(b) $365 + 365 =$



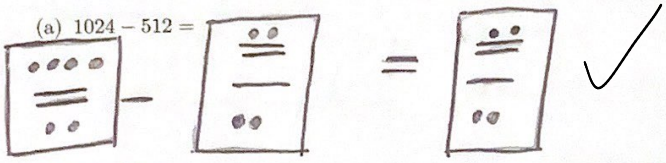
730

(c) $1024 + 512 =$

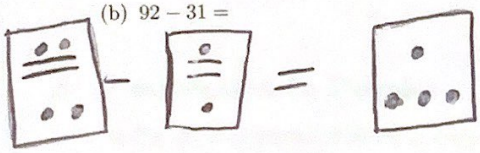


2. Work out the following subtraction problems *using the Mayan system.*

(a) $1024 - 512 =$

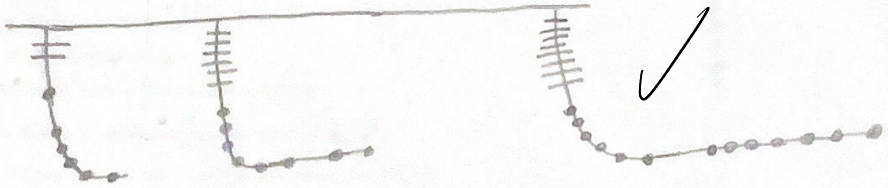


(b) $92 - 31 =$

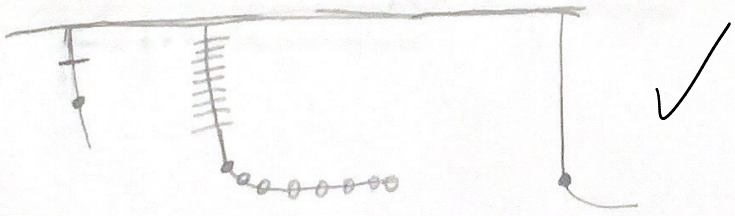


3. Work out the following addition problems *using the Incan quipu:*

(a) $512 + 256 =$



(b) $11 + 89 =$



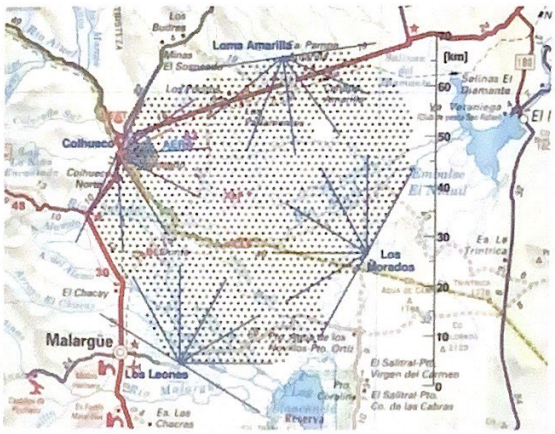
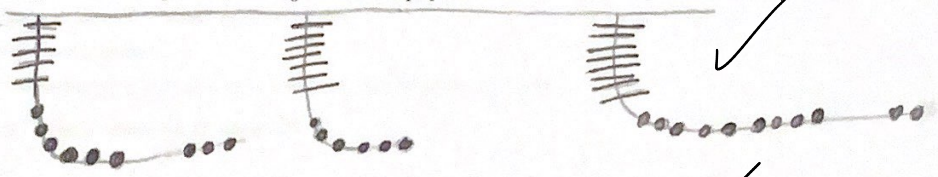


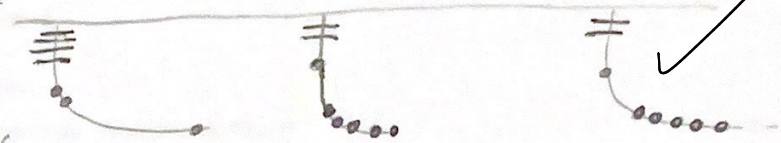
Figure 5: A physics detector near Malargüe, Argentina.

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

(a) $365 - 67 =$

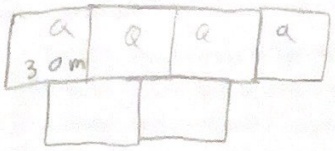


(b) $1024 - 512 =$



5. Suppose you have ~~three~~ 6 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.

5 m



Quinoa = $0.3 \times 0.3\,m = 0.09\,m$

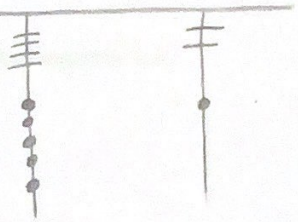
Potato = $0.2 \times 0.2\,m = 0.04\,m$

$Q = (0.09_m \times 150\,m) \times 4 =$ 54 quinoa

$P = (0.04\,m \times 150\,m) \times 2 =$ 12 potatoes

it's a division problem

e.g. $2 \times \frac{150\,m^2}{0.04\,m^2}$



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

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

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

the institutions you list aren't all in Nueva Granada

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. while the Spanish crown was against Enlightenment thinking, the countries had their own feelings. The Jesuits were the first to teach Newtonian physics while the dominicans resisted them. There were scientific expeditions like the Botanical Expeditions to Peru, Nueva Granada, and Nueva España. Some new institutions were mining schools, Royal Spanish Academy, and Royal Botanical Gardens.

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. Tied together physics, chemistry, knowledge about the atmosphere, and what happens when charged particles go through matter. It was a big discovery for modern science at the time. Dimas Rangel conducted an experiment with Alzate where they determined what was in the upper atmosphere. León y Gama also made contributions.

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. The four humors are cold, hold, wet, or dry. These corresponded to bodily fluids and Europeans thought that by defining the fluid they could cure it. There were some mild effects but nothing with significant prof. for broken bones Europeans used dry goat manure to plaster it an Nahua people used a splint to set bones.

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.

(a) Since there was an increasing censorship of knowledge the people felt the need to push against it. Voltaire and Rousseau were philosophers who helped inspire the French revolution and advocate for a social contract between the citizens and the government. People can use enlightenment thinking and think for themselves. (b) The viceroyalties limited the amount of books and type of books that could come from both Europe to Latin America and Latin America to Europe. Books were smuggled in and out of Latin America and private libraries were built. Indigenous treatments were disregarded because they could be heresy. (d) Catholic scholars or Jesuits taught Spanish so Nahuat teachings and medicines could be used. (c) Alzate was blocked by the church but published a journal that talked about the physics of the sun.