Midterm - INTD290

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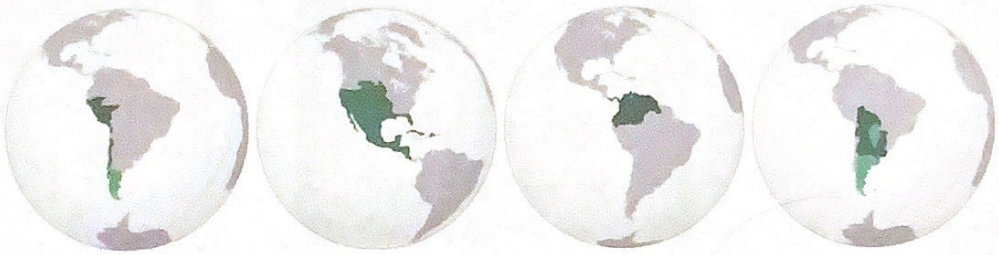
1 How to Submit this Midterm

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? (2)
2. Which of the four *virreinatos* excelled at the exportation of rum? (2)
3. Which of the four *virreinatos* was characterized by an indigenous empire that mastered agriculture in the Andean mountains? (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. Virreinato 2 (b) in Mexico City, in Mexico and Panama
5. List some of the locations explored by La Condamine and his Latin American collegues, and cite the virreinato or virreinatos they explored together. Ecuador, Quito, Virreinato 3
6. The Expedición Botánica of José Celestino Mutis took place in which virreinato? (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? virreinato (3) in Bogotá, Colombia
8. In which country is the Pierre Auger Observatory located? In which virreinato would this country have been in the 18th century? Argentina, virreinato 4

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.

HAWS detector, used for gamma ray detection. It works by detecting charged particles which emit light when charged by gamma radiation.

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?

real de Catorce, it is a central mexican mining village. the silver from these mines drove the economy and financed the scientific community which developed better mining techniques.

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?

Potosi, Bolivia. This city was significant due to its silver ore. It was controled by the Habsburgs and the silver was shipped via cart to Buenos Aires before boats transit to Europe and Africa.

4 Asynchronous Activity Review II

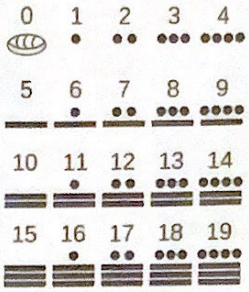


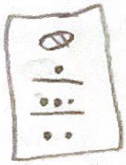
Figure 4: A list of the numerical digits used by the Maya.

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

   (a) $80 + 20 =$ 100 $= 1\times20^2 + 0\times20^1 + 0\times20^0$
   $400 + 80 + 0$
   420

   (b) $365 + 365 =$ 730 $= 7\times20^2 + 3\times20^1 + 0\times20^0$
   $2{,}800 + 60 + 0$
   2,860

   (c) $1024 + 512 =$ 1536 $= 1\times20^3 + 5\times20^2 + 3\times20^1 + 6\times20^0$
   $8{,}000 + 2{,}000 + 60 + 6$
   10,066

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

   (a) $1024 - 512 =$ 512 $5\times20^2 + 1\times20^1 + 2\times20^0$
   $2{,}000 + 20 + 2$
   2022

   (b) $92 - 31 =$ 31 $3\times20^1 + 1\times20^0$
   $60 + 1$
   61

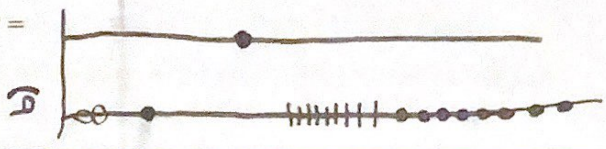
   

3. Work out the following addition problems *using the Incan quipu:*

   (a) $512 + 256 =$

   (b) $11 + 89 =$

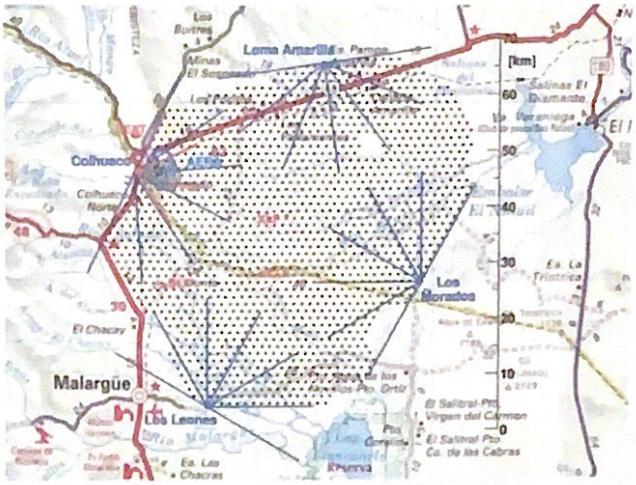
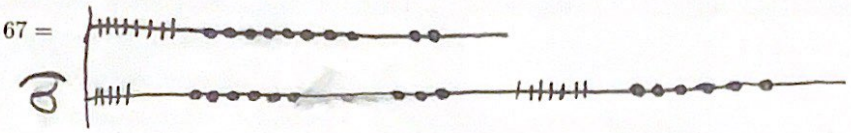


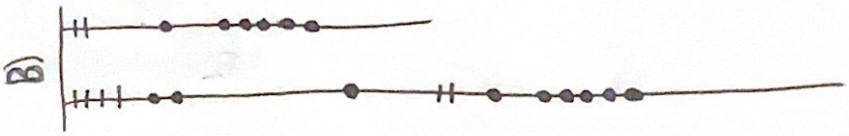
Figure 5: A physics detector near Malargüe, Argentina.

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

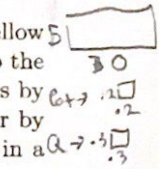
   (a) $365 - 67 =$



   (b) $1024 - 512 =$



5. Suppose you have 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.



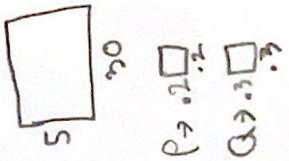
$A = 30m \times 5m = 150m^2$

$A_p = .2 \times .2 = .04m^2$

$A_q = .3 \times .3 = .09m^2$

$2\left(\frac{150m^2}{.04m^2}\right) = 7500$ potatoes

$4\left(\frac{150m^2}{.09}\right) = 6667$ 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

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 *ahuizotl*?

- 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 Pulo*, 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.

Kepler's laws and Newtonian Physics were widely accepted within the scientific communities throughout Nueva Granada and Perú, however these studies met resistance when it came to formal academic communities, as they were regulated by governing bodies that rejected rationalism.

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.

reproduction of florescent lights in laboratory using electricity

The aurora being visible in mexico city is significant because it allied scientists from many disciplines to come together to study and seek to understand it. Also the cooperation between engineers understanding electricity, chemists understanding gasses, and physicists understanding magnetic fields lead to the reproduction of florescent light in a laboratory using electricity.

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.

cinchona

Humorism was what europeans used to understand medicine and the body. the 4 humors are: Blood, Yellow Bile, Black Bile, and Phlegm. Because of their restrictive understanding of the body, colonials dismissed indiginous cures such as Cinchona because, in their understanding, it could not help the body in any way since it didn't help any of the 4 humors.

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) the catholics restricted and banned enlightenment literature from entering and influencing scholars in latin America.

b) the catolic church heavily restricted information on indigenous lifestyles from getting to europe in order to avoid scandalous discussions.

c) La condamine's Geodetic mission spread the practices of rationalistic science through latin america

d) Father Juan Magnin made La condamine the map he used to explore the missions, and magnin taught at the University in Lima.