Midterm - INTD290

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47/50

excellent

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? Nueva España ✓
2. Which of the four *virreinatos* excelled at the exportation of rum? Nueva España (-1)
3. Which of the four *virreinatos* was characterized by an indigenous empire that mastered agriculture in the Andean mountains? Peru ✓
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. Observed from Mexico city in Nueva España ✓ countries? (-1/2)
5. List some of the locations explored by La Condamine and his Latin American collegues, and cite the virreinato or virreinatos they explored together. Explored Andes and Amazon river. Explored Andes in virreinato Peru ✓
6. The Expedición Botánica of José Celestino Mutis took place in which virreinato? Nueva Granada ✓
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? Nueva granada in city Bigota ✓
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 came from virreinato of Río de la plata ✓

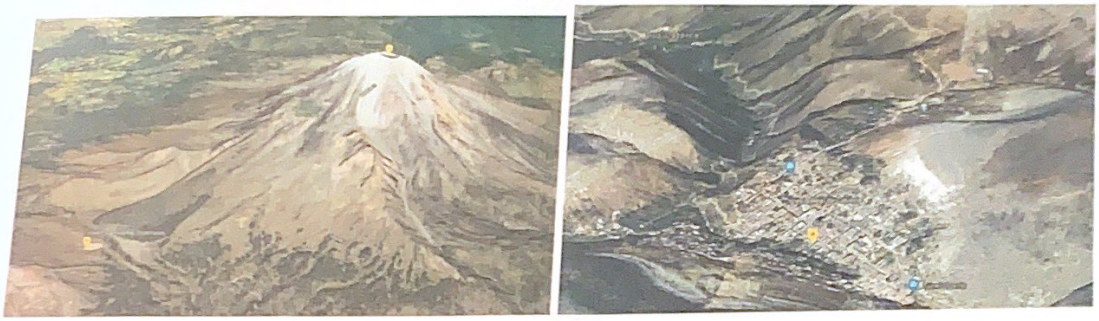


Figure 2: (Left) A physics detector near Pico de Orizaba in Mexico. (Right) A town in central Mexico.

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

3 Asynchronous Activity Review I

Well done

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 physics detector near Pico de Orizaba in Mexico was the HAWC gamma-ray observatory. It involves a water tank that has electrons moving at speed of light into it but it moves slower in the water. The particles moving through cause flashs of light that get recorded. Its purpose is it can catch different particles and see the direction the particles came from and see how many particles.

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?
The location is relevant because the different mines there the produced silver. In order to make process more efficent needed to train and teach different people proper ways to mine. which involved chemistry and mining which led to establishment of mining schools and scientific communities.

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 being shown is Potosi which is in Boliva. The this city significantly for its mining industry which was exported to many different countries. It was controlled spain and they were removing the silver from this area.

4 Asynchronous Activity Review II

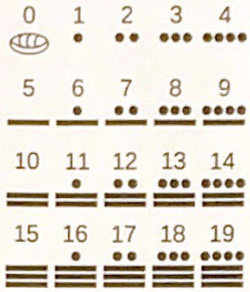
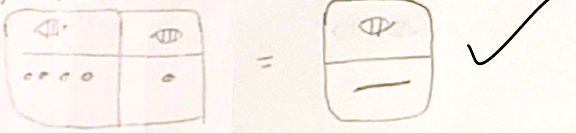


Figure 4: A list of the numerical digits used by the Maya.

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

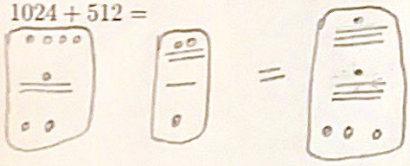
   (a) $80 + 20 =$

   (b) $365 + 365 =$

   (c) $1024 + 512 =$

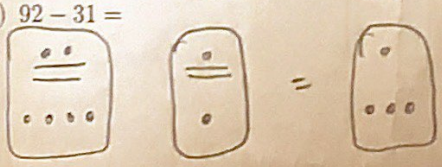
   yay! perfect

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

   (a) $1024 - 512 =$

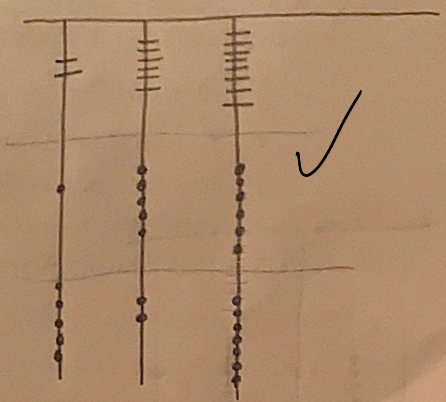
   

   (b) $92 - 31 =$

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

   (a) $512 + 256 =$

   (b) $11 + 89 =$

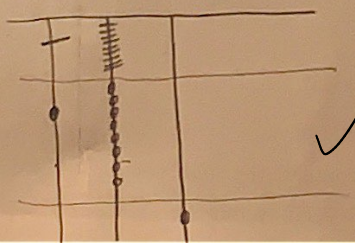
   

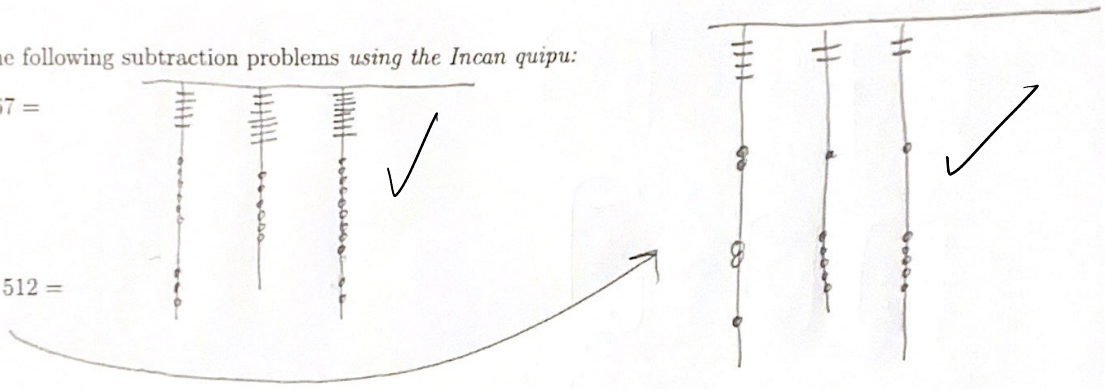
Figure 5: A physics detector near Malargüe, Argentina.

yay!

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

   (a) $365 - 67 =$

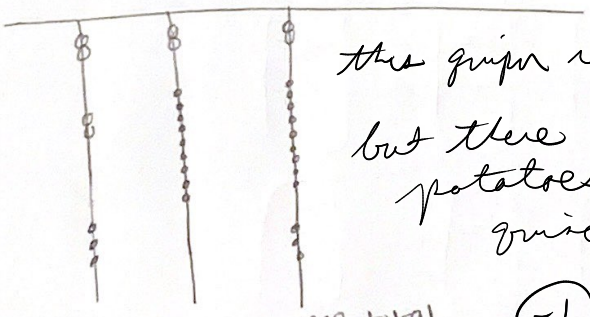
   (b) $1024 - 512 =$



5. Suppose you have three 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.

30 m
5 m | 0 (150) potatoes
150
+150
300 potatoe

3 | 3 (90) quinoa
90 quinoa



this quipu represents 390, but there are 7500 potatoes and 6667 quinoa.

390 total

(-1)

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 ✓

potatoes: $\frac{2 \times 30 \times 5}{(0.2)(0.2)}$

$= 2 \times 25 \times 30 \times 5$

$= 50 \times 30 \times 5$

$= 1500 \times 5$

$= 7500$

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

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 goal of Newtonian physics was to establish a new philosophy opposed to scholastic thought where explain reality through observation and experience. Different universities and academic communities wanted to incorporate new philosophies such as universidad Gregoriana (1740s), universidad Javeriana, universidad de Caracas (1788). Different groups such as the Jesuits and Dominicans wanted to control the spread of scientific knowledge to maintain power. Many different debates over theories such as between Jose Celestino Mutis and Dominican congregation in 1773. the debate was over opposing philosophical concepts but mostly social and political interests were a focus over the goal of controlling education.

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. An aurora is formed when solar wind from the sun goes towards Earth's magnetic field when reaches Earths atmosphere it collides with oxygen and nitrogen which releases colorful glows around the poles. The aurora borealis in 1789 sparked interest in many researchers around the world. Alzate and Ramirez predicted the aurora was seen in many countries and collected data from many cities to determine the geometry of the ring. León and Gama it correlated with the ether and different moon phases caused the aurora Dimas Rangel created an experimental design to replicate the effects from the aurora using a fluorescent light.

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 theory of four humors was a theory of medicine which classified four different fluids in the body. Then each fluid had a different color and temperature which the aligned with different elements that were also classified as hot/cold and moist/dry. Indigenous treatments could be classified in this system but it was very complex and did not always work. Some treatment examples include the use of cacao which can help with digestion. Europeans brought balsam which is similar to xilo which has medicinal properties. Also tzipipatli was commonly used to treat diarrhea and different bowel problems.

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. Different scientific revolution and enlightenment knowledge was often being spread from Europe and Latin America that the catholics wanted to censor. such as books from Voltaire and Rousseau were banned and often smuggled into Spain and Mexico. The church wanted to maintain power therefore control revolutionary knowledge so people would not revolt. The catholic church wanted to control knowledge such as the structure of the universe and Earth they wanted to maintain the biblical perspective about the structure of Earth and restrict teachings from people like Newton. Different indigenous practices and treatments were censored from reaching Europe because went against catholic practices. Often times indigenous treatments in Nahuatl were forced to be translated to spanish by Jesuits so they would know the treatments.

✓ Well said

✓

✓

→ this last part is like (d), but what about part (c)?

-1/2