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46/50

Well done

Midterm - INTD290

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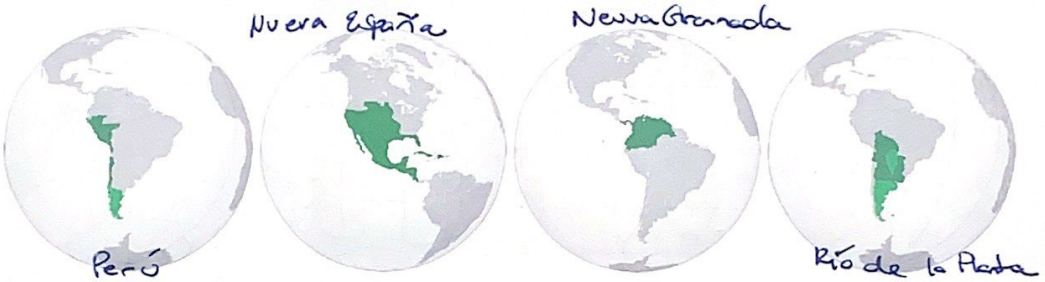
1 How to Submit this Midterm

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? (b)
2. Which of the four *virreinatos* excelled at the exportation of rum? (c)
3. Which of the four *virreinatos* was characterized by an indigenous 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. Mexico City, Teotihuacan, San Miguel el Grande, all in (b) Nueva España. Other observations made in Spain & Russia.
5. List some of the locations explored by La Condamine and his Latin American collegues, and cite the virreinato or virreinatos they explored together. Perú, Quito, the Amazon River. Explored (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) Santa Fe de Bogota
8. In which country is the Pierre Auger Observatory located? In which virreinato would this country have been in the 18th century? Argentina (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 physics detector shown is the HAWC Gamma Ray Observatory. This detectors works by having a lot of large water tanks placed in a grid that absorb gamma rays as they hit the atmosphere and burst into a shower of electromagnetic particles. It detects the direction in which the ray 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?

   The cities in Fig 2 (right) are mining (silver) towns that funded private scientific developement in order to have educated engineers, these then developed into colleges that taught modern science during the 18th century.

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 being shown is Potosí, located in Bolivia (virreinato Perú). Famous for the Cerro rico; a gaint pile of silver. ~~The biggest silver exporter~~. It was controlled by Spanish conquistadors. The city produced 1/2 of the worlds silver and shipped to Europe & Africa by following the coast and then crossing the Atlantic.

   later, Hapsburg crown

"Cerro rico"

4 Asynchronous Activity Review II

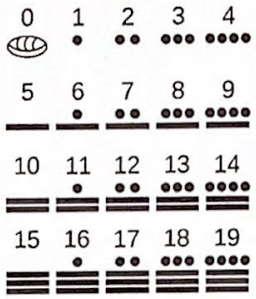
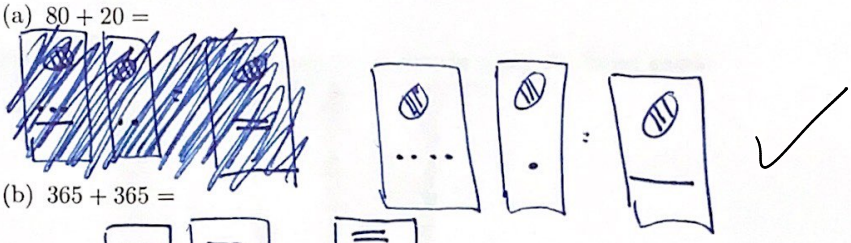


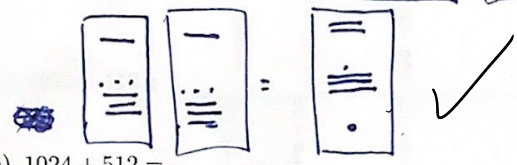
Figure 4: A list of the numerical digits used by the Maya.

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

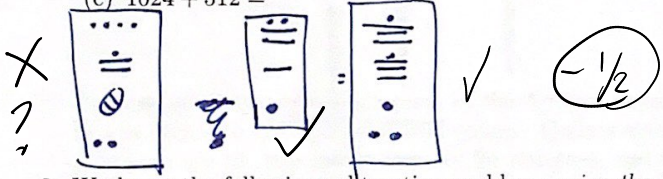
   (a) $80 + 20 =$

   (b) $365 + 365 =$

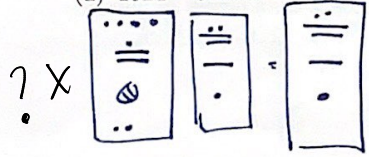
   

   (c) $1024 + 512 =$

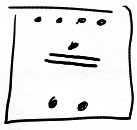
2. Work out the following subtraction problems *using the Mayan system.*

   (a) $1024 - 512 =$

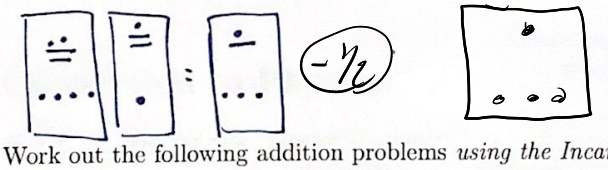
   

   (I can tell you mean 1024 from above)

   $1024 =$

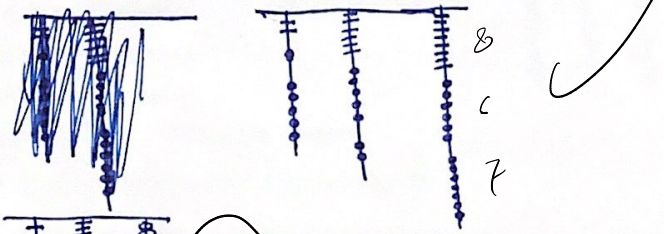
   

   (b) $92 - 31 =$

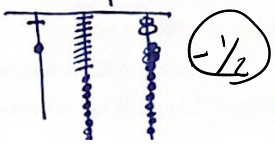
   

3. Work out the following addition problems *using the Incan quipu:*

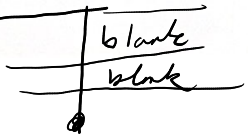
   (a) $512 + 256 =$

   (b) $11 + 89 =$

   you can take the 10 tens and make 100 like:

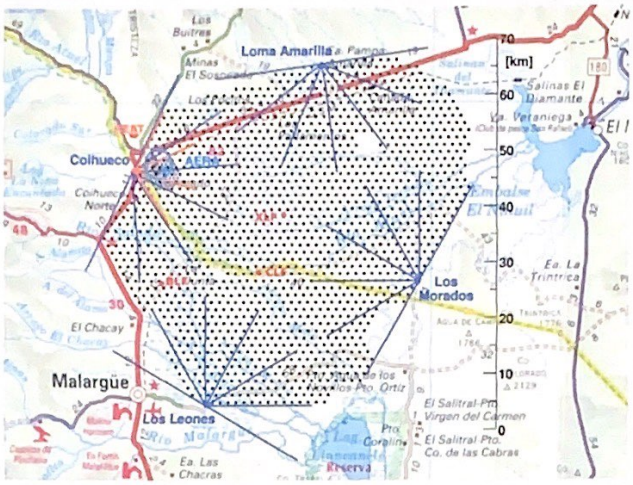
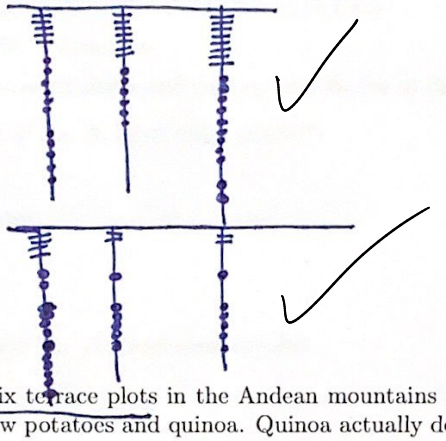


Figure 5: A physics detector near Malargüe, Argentina.

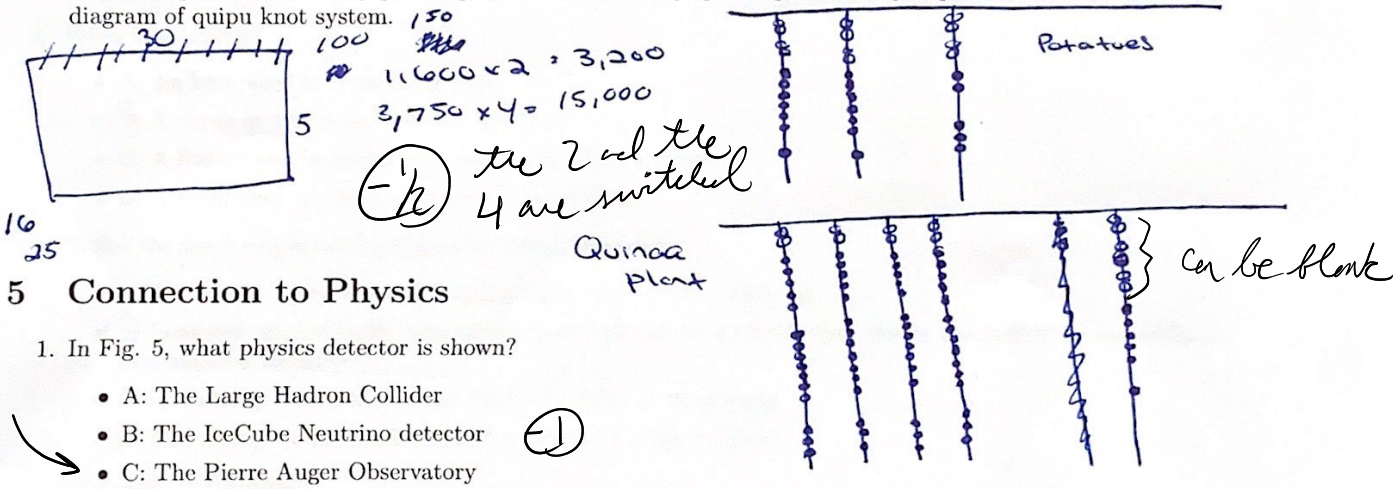
4. Work out the following subtraction problems *using the Incan quipu:*

   (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.



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 *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.

During the 18th century Perú and Nueva Granada saw variations and changes towards the scientific and academic communities. In the universities of Perú & Nueva Granada under the control of Jesuits were taught Newtonian physics, when the Dominican took over Newtonian physics was not practiced or taught. Throughout the 18th century acceptance of science & academics that challenged religious or royal authority was unwelcome by many educators in Dominican universities.

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.

The aurora of 1789 pushed scientists to determine the physics, chemistry, and the charged particles through matter of the aurora. Researchers such as Dimas Rangel, Alzate y Ramírez, and León y Gama made observations of this aurora. They found that the auroras were observed in other countries. Marian believed it was matter from the suns atmosphere and the auroras took place above Earth's atmosphere

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 is a medival theory of medicine based on four classes of fluids in the body. Each was associated with a color and had temperature & moisture classifications. (Blood, black bile, yellow bile, & phlem). For example if one had a fever (hot & dry disease) the culprit was yellow bile then the doctor would prescribe to increase it's opposite; Phlem; by using cold baths. The Europeans did not understand how herbs and humors could be practical medicine until they witnessed and began using the 4 humors for medical diagnosis/reasoning.

indigenous cures?

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) Catholics did not allow readings and teachings of Scientific Revolution ideas like those of Voltaire and Rosseau and the Social Contract, because it could impact the power complex and beliefs of the area.

B) The Catholics also censored knowledge given to Europe, such as Indigenous treatments such as Quipu math as well as herbal remmedies osed in medicine as well as religous rituals. For example Salvia which is a herb that can be smoked similar to tobaco but causes psychadelic trips.

(Quipu were not treatments)

C) Catholic priest Alzate continously practiced science and after much censorship he was able publish of the Physics of the Sun journal.

Gazetas de México

D) Jesuit priests translated Nahutal medicine into Spanish which lead to modern medicine practices to treat ~~syphilis~~ syphilis and dysentery.