

Taylor
De La Rosa

Midterm - INTD290

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44.5/50

good job

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



1. In which of the four *virreynatos* of the Spanish colonial empire (shown in Fig. 1) was the *tlé huitzilín* classified by the indigenous? **B** ✓
2. Which of the four *virreynatos* excelled at the exportation of rum? **C** ✓
3. Which of the four *virreynatos* 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 *virreynatos* are these cities? List some other countries in which corresponding observations were made. **(-1/2) cities, other nations** ✓
5. List some of the locations explored by La Condamine and his Latin American colleagues, and cite the *virreinato* or *virreynatos* they explored together. **In Mexico (B.)** ✓
6. The Expedición Botánica of José Celestino Mutis took place in which *virreinato*? **Quinto / La Rochelle to Cartingue, Cartagena, through Panama to Port of Manta (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) Columbia** ✓
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.

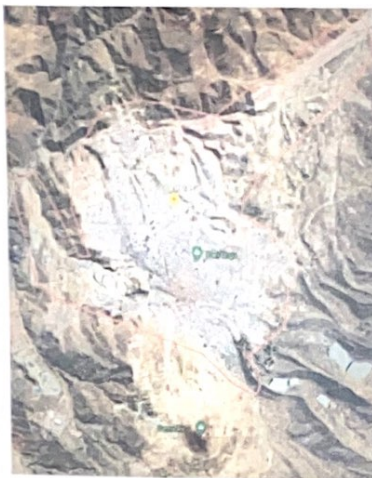


Figure 3: A historical location in Latin America known for driving a particular economic sector.

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 high altitude water Cherenkov (HAWC).
This instrument detects high energy cosmic gamma rays, it will have high-energy particles strike the water in result of the Cherenkov light detected.

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 Mexican cities were found to have silver in the local area and this a big mining center. Colleges in Mexico were typically not in this area, but would draw scientists to explore the city.

-1/2 the economic drive helped create the colleges

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, in Bolivia. Antonio Jose de sucre was in control of reform. This city was known for its silver. Potosi was the major supply for silver, they would ship it out on backs of llamas and mules.

4 Asynchronous Activity Review II

| | | | | |
|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 |
| | | | | |
| 5 | 6 | 7 | 8 | 9 |
| | | | | |
| 10 | 11 | 12 | 13 | 14 |
| | | | | |
| 15 | 16 | 17 | 18 | 19 |
| | | | | |

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

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

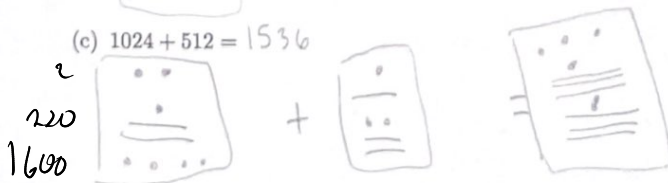
(a) $80 + 20 = 100$



(b) $365 + 365 = 730$



(c) $1024 + 512 = 1536$

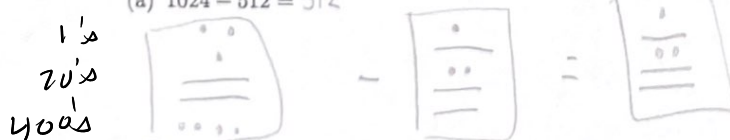


1822?

220
1600

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

(a) $1024 - 512 = 512$



wrong symbols but
correct pattern

(b) $92 - 31 = 61$

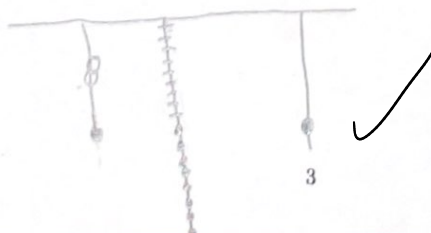


3. Work out the following addition problems using the Incan quipu:

(a) $512 + 256 = 768$



(b) $11 + 89 = 100$



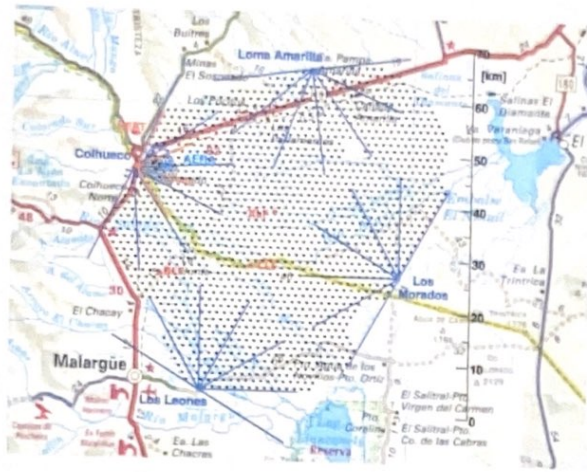
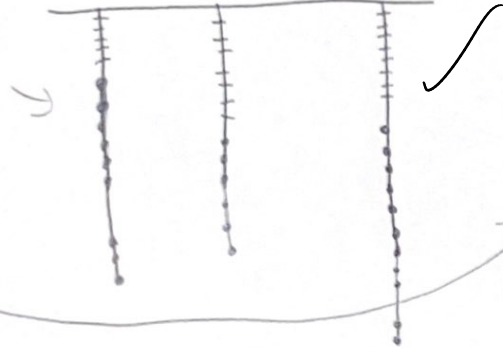


Figure 5: A physics detector near Malargüe, Argentina.

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

(a) $365 - 67 =$

298



(b) $1024 - 512 =$

512



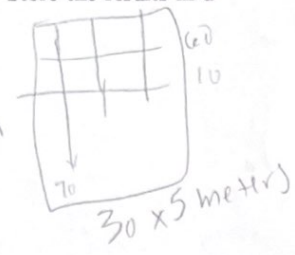
5. Suppose you have six terrace plots in the Andean mountains to use to survive. You and your cohort of fellow Incans decide to grow potatoes and quinoa. Quinoa actually do better at higher altitudes than potatoes. So the plan is to use the two lowest terraces for potatoes, and the upper four for quinoa. 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.

Quinoa → $0.3 \times 0.3 \text{ patch each}$
 Potatoes → $0.2 \times 0.2 \text{ patch each}$

$30 \times 5 = 150 \text{ m}^2$
 $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9} \text{ m}^2$

$\frac{150 \text{ m}^2}{\frac{1}{9} \text{ m}^2} = 1350 \text{ quinoa}$

$\frac{150 \text{ m}^2}{\frac{1}{4} \text{ m}^2} = 600 \text{ potatoes}$



Quinoa = 1350
 Potatoes = 600

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

$\frac{1}{2}$ scaling error

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 to 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 guilds 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 levels of acceptance from scientific and academic communities comes from universities such as the school of mining, botanical garden, military academy of math, University of Lima, academy of geometry. These universities continued a debate to incorporate Enlightenment ideas instead of Newtonian. There were also scientific journals, the first journal was the *Diario Literario*, which was the first scientific journal. Jose Mutis emphasized teaching new sciences and philosophy. In 1767, Mutis presented his journal "Reflections on the Tycho system", to defend Copernican ideas.

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 borealis that were visible in Mexico City were significant because there was an experiment performed and the lights in 1789 were low latitude aurora which were not as common. Antonio de León y Gama and Alzate were two common researchers who studied and observed these auroras at scientific conferences to discuss what their findings were and their findings on the low latitude auroras, the auroras were also known as northern lights that have electrons move up to a higher energy state usually in high altitude.

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.

✓ Treatments include drinking boiled water with *tzipipatli* for diarrhea, using *Zacacilli* root for bone breaks, or expelling the seed for desire. The four humors were understood as the body's four blood, yellow bile, phlegm, and black bile. If someone had a disease it was assumed they were lacking or had an excess of the 4 humors. It was also classified as a combination of cold, hot, dry, or moist. The indigenous treatments and people did not believe in these ideas.

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) Voltaire and Rousseau helped explain and bring new ideas that opposed other ideas to bring ideas that you can use reason based on Enlightenment ideas and helped inspire the ideas of a social contract which eventually got banned because their several ideas didn't follow the censorship.

✓ b) treatments such as the chinaberly that could be used for religious and medical purposes. It can cure syphilis but also get rid of demons. Quipu is another example of how they were destroyed and rejected for idolatry, which can be different from their point of view.

✓ c) Catholic scholars such as Alzate, who was a priest who released journals got rejected many times. By talking about science and the sun particles that other religious people didn't agree on.

✓ d) The nahvati medicine was translated to Spanish by the Catholic priests. By doing this both groups can communicate and spread religion and also medicine to each other.