

Math 1303 - Math in the Liberal Arts

Exam 1

Assigned: 2020.09.09, 12:01 AM

Due: 2020.09.09 at 11:59 PM

Instructions: Work on this by yourself, if you feel you need to ask a question for clarification purposes, you may email the instructor. For each problem be sure to show all of your work and write every step down in a clear and concise manner. When finished, upload this front sheet and all of your work, as a pdf or jpg to Blackboard.

Agreement: Please read the following statement and then write it at the bottom of the page before the signature line:

"I hereby swear that all the work that appears on this exam is completely my own, and I have not discussed any portion of this exam with any one else besides the instructor."

Printed Name: _____

Signature: _____

Date: _____

1. Construct truth tables for the following statements:

- (a) $[(p \rightarrow q) \wedge (p \rightarrow r)] \leftrightarrow [p \rightarrow (q \wedge r)]$
- (b) $(p \vee q \vee r) \leftrightarrow [(\sim p \wedge \sim q) \rightarrow r]$

For problems 2–5, let p , q , r , and s be the following sentences:

p : There is no open water on the planet Arrakis.

q : Arrakis is a desert planet.

r : Sandworms live in the desert.

s : Arrakis is the only planet on which sandworms thrive.

2. Use p , q , r , and s as above to write each of the following symbolic statements in words.

- (a) $q \rightarrow p$
- (b) $r \wedge s$
- (c) $(r \wedge s) \rightarrow q$
- (d) $s \leftrightarrow (p \wedge q)$

3. State the negation of the following sentence without using a conditional sentence form:

If spice melange can be found in the desert, then sandworms also live in the desert.

4. State the negation of the following sentence without using a conjunction:

Walk across the desert in an irregular pattern and conserve your water carefully.

5. Consider the following argument:

If Arrakis is a desert planet, then Arrakis is the only planet on which sandworms thrive. If there is no open water on Arrakis, then sandworms live in the desert. Arrakis is a desert planet or sandworms do not live in the desert. Therefore, Arrakis is the only planet on which sandworms thrive or there is some open water on Arrakis.

- (a) Translate the above argument into symbolic form using the definition of p , q , r , and s as defined previously.
- (b) Determine if the argument is valid or a fallacy.

6. Use a Venn diagram to determine if the following syllogism is valid or is a fallacy.

Some people live in the desert of Arrakis.

Some people who live on Arrakis are Fremen.

All Fremen live in the desert.

Some people who live on Arrakis can ride sandworms.

All Fremen can ride sandworms.

∴ Only those who live in the desert can ride sandworms.