MATH325: Discrete Mathematics II
Quiz q080604

Name: nweadick1@cougars.ccis.edu   Score:

Open `main.tex` and enter answers (look for `answercode`, `answerbox`, `answerlong`). Turn the page for detailed instructions. To rebuild and view pdf, in bash shell execute `make`. To build a gzip-tar file, in bash shell execute `make s` and you'll get `submit.tar.gz`.

This is a 5-min quiz.

Some LATEX help:

- `$\binom{6}{2}$` gives $\binom{6}{2}$
- `$12^{13}$` gives 12^{13}
- `$42!$` gives $42!$

Q1. Compute $\phi(900)$. You must simplify your answer as an integer. Write ERROR if the problem cannot be solved.
ANSWER:

240

(You only need to state the answer.)

Q2. Write down an expression for $\phi(pq)$ in terms of p and q and with numeric operations add, subtraction, multiplication (i.e., $+, -, \cdot$) – nothing else should appear. Here p,q are odd primes. Write ERROR if the problem cannot be solved.
ANSWER:

$if\, gcd(m,n) = 1 then Euler(mn) = Euler(m)Euler(n)$

(You only need to state the answer.)

Q3. If $\phi(pq)$ divisible by 4? Here p,q are odd primes. Write ERROR if the problem cannot be solved.
ANSWER:

TRUE

(Write T for TRUE and F for FALSE. You only need to state the answer.)

Q4. How many onto functions are there from $X \to Y$ where $|X| = 6$ and $|Y| = 4$. You need not simplify your answer and can have binomial coefficients, exponentiation,

etc. in your answer.

Answer:

1560

(You only need to state the answer.)

Instructions

In `main.tex` change the email address in

```
\renewcommand\AUTHOR{jdoe5@cougars.ccis.edu}
```

yours. In the bash shell, execute "`make`" to recompile `main.pdf`. Execute "`make v`" to view `main.pdf`. Execute "`make s`" to create `submit.tar.gz` for submission.

For each question, you'll see boxes for you to fill. You write your answers in `main.tex` file. For small boxes, if you see

```
1 + 1 = \answerbox{}.
```

you do this:

```
1 + 1 = \answerbox{2}.
```

`answerbox` will also appear in "true/false" and "multiple-choice" questions.

For longer answers that needs typewriter font, if you see

```
Write a C++ statement that declares an integer variable name x.
\begin{answercode}
\end{answercode}
```

you do this:

```
Write a C++ statement that declares an integer variable name x.
\begin{answercode}
int x;
\end{answercode}
```

`answercode` will appear in questions asking for code, algorithm, and program output. In this case, indentation and spacing is significant. For program output, I do look at spaces and newlines.

For long answers (not in typewriter font) if you see

```
What is the color of the sky?
\begin{answerlong}
\end{answerlong}
```

you can write

```
What is the color of the sky?
\begin{answerlong}
The color of the sky is blue.
\end{answerlong}
```

For students beyond 245: You can put LaTeX commands in `answerbox` and `answerlong`.

A question that begins with "T or F or M" requires you to identify whether it is true or false, or meaningless. "Meaningless" means something's wrong with the statement and it is not well-defined. Something like "$1+_2$" or "$\{2\}^{\{3\}}$" is not well-defined. Therefore a question such as "Is $42 = 1+_2$ true or false?" or "Is $42 = \{2\}^{\{3\}}$ true or false?" does not make sense. "Is $P(42) = \{42\}$ true or false?" is meaningless because $P(X)$ is only defined if X is a set. For "Is $1 + 2 + 3$ true or false?", "$1 + 2 + 3$" is well–defined but as a "numerical expression", not as a "proposition", i.e., it cannot be true or false. Therefore "Is $1 + 2 + 3$ true or false?" is also not a well-defined question.

When writing results of computations, make sure it's simplified. For instance write 2 instead of $1 + 1$. When you write down sets, if the answer is $\{1\}$, I do not want to see $\{1, 1\}$.

When writing a counterexample, always write the simplest.

Here are some examples (see `instructions.tex` for details):

1. T or F or M: $1 + 1 = 2$ .... $\boxed{\text{T}}$

2. T or F or M: $1 + 1 = 3$ .... $\boxed{\text{F}}$

3. T or F or M: $1+^2 =$ .... $\boxed{\text{M}}$

4. $1 + 2 = \boxed{3}$

5. Write a C++ statement to declare an integer variable named `x`.

   ```
   int x;
   ```

6. Solve $x^2 - 1 = 0$.

   Since $x^2 - 1 = (x - 1)(x + 1)$, $x^2 - 1 = 0$ implies $(x - 1)(x + 1) = 0$. Therefore $x - 1 = 0$ or $x = -1$. Hence $x = 1$ or $x = -1$.

7. Which is true? .... $\boxed{\text{C}}$
   - (A) $1 + 1 = 0$
   - (B) $1 + 1 = 1$
   - (C) $1 + 1 = 2$
   - (D) $1 + 1 = 3$
   - (E) $1 + 1 = 4$