

TEXAS A&M UNIVERSITY (TAMU) MATH 367 STRUCTURE OF MATHEMATICS III TEST 1 PRACTICE (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

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- 1. Which statement correctly distinguishes a valid argument from a sound argument?**
- A. A deductive argument is valid if, whenever the premises are true, the conclusion must be true; it is sound if it is valid and the premises are actually true.
 - B. A valid argument requires all premises to be true, and a sound argument requires the conclusion to be true.
 - C. An argument can be valid even if the premises are false, and soundness has nothing to do with truth of premises.
 - D. Validity depends on the actual truth of the premises, while soundness does not.
- 2. Two angles are supplementary if their measures sum to:**
- A. 90 degrees.
 - B. 180 degrees.
 - C. 270 degrees.
 - D. They are equal in measure.
- 3. State Euclid's lemma: If p is prime and p divides ab , what must be true?**
- A. p does not divide a
 - B. p divides both a and b
 - C. p is not prime
 - D. p divides a or p divides b
- 4. If A, B, C are collinear with B between A and C , which equality must hold?**
- A. $AB + BC = AC$.
 - B. $AB = BC$.
 - C. $AB > BC$.
 - D. $AB < BC$.
- 5. Negation of the statement 'Every dog has four legs' is which of the following?**
- A. Some dogs do not have four legs
 - B. All dogs have four legs
 - C. No dog has four legs
 - D. Every dog has more than four legs

6. In a proof by contradiction, which assumption is made to derive a contradiction?
- A. Not P
 - B. Q
 - C. P and not Q
 - D. P and Q
7. An obtuse angle has a measure that is:
- A. Greater than 180 degrees.
 - B. Greater than 90 but less than 180 degrees.
 - C. Equal to 90 degrees.
 - D. Less than 90 degrees.
8. If $AB = CD$, what can be concluded about segments AB and CD?
- A. AB is congruent to CD
 - B. AB and CD are perpendicular
 - C. AB and CD are parallel
 - D. AB and CD are disjoint
9. Let a, b, c be integers with $a \mid b$ and $b \mid c$. Which statement must be true?
- A. $a \mid b$
 - B. $b \mid c$
 - C. $c \mid a$
 - D. $a \mid c$
10. If $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$, which statements hold?
- A. $a+c \equiv b+d \pmod{n}$ and $ac \equiv bd \pmod{n}$
 - B. $a+c \equiv b+d \pmod{n}$ but $ac \equiv bd \pmod{n}$ is false
 - C. $a+c \equiv bd \pmod{n}$ and $ac \equiv b+d \pmod{n}$
 - D. $a+c \equiv b+d \pmod{n}$ only if n is prime

Answers

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1. A
2. B
3. D
4. A
5. B
6. C
7. B
8. A
9. D
10. A

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Explanations

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1. Which statement correctly distinguishes a valid argument from a sound argument?

- A. A deductive argument is valid if, whenever the premises are true, the conclusion must be true; it is sound if it is valid and the premises are actually true.
- B. A valid argument requires all premises to be true, and a sound argument requires the conclusion to be true.
- C. An argument can be valid even if the premises are false, and soundness has nothing to do with truth of premises.
- D. Validity depends on the actual truth of the premises, while soundness does not.

The main idea is distinguishing between logical form (validity) and actual truth (soundness). A deductive argument is valid when it is impossible for the premises to be true and the conclusion false; in other words, if the premises were true, the conclusion would have to be true. Soundness adds a real-world truth condition: a sound argument is valid and its premises are actually true, which guarantees the conclusion is true. This statement captures that distinction: validity is about the conditional relationship between premises and conclusion—if the premises are true, the conclusion must be true. Soundness then requires that the premises are actually true as well. That's why it's the best choice. Why the other ideas don't fit: validity does not require all premises to be true; it's about the logical connection, not the actual truth of premises. An argument can be valid even with false premises. Conversely, soundness does depend on the premises being true, not just the validity of the form. And validity is not about the actual truth of the premises; it's about what would follow if the premises were true.

2. Two angles are supplementary if their measures sum to:

- A. 90 degrees.
- B. 180 degrees.
- C. 270 degrees.
- D. They are equal in measure.

Two angles are supplementary when their measures add up to 180 degrees. This matches the idea of a straight angle, which is formed by a straight line and measures 180 degrees; if two angles share a vertex and their non-common sides form that straight line, their measures fill the 180 degrees. For example, 120 degrees and 60 degrees are supplementary because $120 + 60 = 180$. So the correct sum is 180 degrees. The other options don't define supplementation: 90 degrees would be a complementary pair (sums to 90), and 270 degrees would exceed a straight angle. Being equal in measure isn't required (they can be 90 and 90, which is supplementary, but they could also be 120 and 60).

3. State Euclid's lemma: If p is prime and p divides ab , what must be true?

- A. p does not divide a
- B. p divides both a and b
- C. p is not prime
- D. p divides a or p divides b

Euclid's lemma says that if a prime p divides the product ab , then p must divide one of the factors: either p divides a or p divides b (or both). The reason is: if p does not divide a , then $\gcd(p, a) = 1$. Since p divides ab and $\gcd(p, a) = 1$, a standard property of integers forces p to divide b . So at least one of the divisibilities holds. It's possible for p to divide both a and b , but that isn't required; the lemma guarantees at least one.

4. If A, B, C are collinear with B between A and C, which equality must hold?

A. $AB + BC = AC$.

B. $AB = BC$.

C. $AB > BC$.

D. $AB < BC$.

When three points lie on a line and one point sits between the other two, the distance from the outer points equals the sum of the two inner distances. Here, B is between A and C, so traveling from A to C along the line passes through B. The path length AB plus BC adds up to the direct distance AC, giving $AB + BC = AC$. Distances are nonnegative, and this additive property holds exactly in this configuration, regardless of how AB compares to BC. The other relations aren't guaranteed by B being between A and C; only $AB + BC = AC$ must hold.

5. Negation of the statement 'Every dog has four legs' is which of the following?

A. Some dogs do not have four legs

B. All dogs have four legs

C. No dog has four legs

D. Every dog has more than four legs

The main idea is how negating a universal (every) statement works. If something is stated as "every dog has four legs," that claims there are no counterexamples. Its negation says there exists at least one counterexample: a dog that does not have four legs. In plain language, that's "Some dog does not have four legs." This is the best fit because it directly captures the existence of a counterexample. The other options don't express the negation: repeating the original statement would be just the same claim, saying all dogs have four legs; saying no dog has four legs asserts nobody has four legs, a different claim; and saying every dog has more than four legs changes the property involved, not the negation.

6. In a proof by contradiction, which assumption is made to derive a contradiction?

A. Not P

B. Q

C. P and not Q

D. P and Q

To prove an implication by contradiction, you test the only way the implication could be false: assume the premise is true and the conclusion is false. In other words, you assume P and not Q and then try to derive a contradiction. If that leads to an impossibility, the implication $P \rightarrow Q$ must hold. That's why the correct assumption is P and not Q. The other options don't set up the situation where an implication can fail: not P would be testing the truth of P itself, Q assumes the conclusion is true, and P and Q together don't create a contradiction.

7. An obtuse angle has a measure that is:

- A. Greater than 180 degrees.
- B. Greater than 90 but less than 180 degrees.**
- C. Equal to 90 degrees.
- D. Less than 90 degrees.

An obtuse angle is defined as having a measure greater than 90 degrees but less than 180 degrees. It sits between a right angle (90 degrees) and a straight angle (180 degrees). So the option describing an angle greater than 90 degrees and less than 180 degrees matches exactly. If an angle were larger than 180, it would be a reflex angle; if it were exactly 90, it would be a right angle; if it were less than 90, it would be acute.

8. If $AB = CD$, what can be concluded about segments AB and CD?

- A. AB is congruent to CD**
- B. AB and CD are perpendicular
- C. AB and CD are parallel
- D. AB and CD are disjoint

The key idea is that equal lengths mean congruence of segments. If the length of segment AB equals the length of segment CD, then AB is congruent to CD. Congruence focuses on size, not position or direction, so the two segments can be anywhere in the plane and still be congruent. The other statements aren't guaranteed by equal lengths: they could be positioned so they're not parallel or perpendicular, and they could even intersect or be disjoint. So the correct takeaway is that equal lengths translate to AB being congruent to CD.

9. Let a, b, c be integers with $a \mid b$ and $b \mid c$. Which statement must be true?

- A. $a \mid b$
- B. $b \mid c$
- C. $c \mid a$
- D. $a \mid c$**

Transitivity of divisibility: if a divides b and b divides c , then a divides c . Because there exist integers m and n with $b = a \cdot m$ and $c = b \cdot n$, we get $c = (a \cdot m) \cdot n = a \cdot (m \cdot n)$. Hence a divides c . This conclusion must hold for any integers a, b, c satisfying the two given conditions. The other statements either just restate the premises or would require extra assumptions (for example, the reverse divisibility $c \mid a$ is not guaranteed).

10. If $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$, which statements hold?

- A. $a+c \equiv b+d \pmod{n}$ and $ac \equiv bd \pmod{n}$
- B. $a+c \equiv b+d \pmod{n}$ but $ac \equiv bd \pmod{n}$ is false
- C. $a+c \equiv bd \pmod{n}$ and $ac \equiv b+d \pmod{n}$
- D. $a+c \equiv b+d \pmod{n}$ only if n is prime

The essential idea is that congruence is preserved under addition and multiplication. If $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$, you can replace a with b and c with d inside sums and products without changing the result modulo n . For the sum, $(a+c) - (b+d) = (a-b) + (c-d)$. Each of $a-b$ and $c-d$ is a multiple of n , so their sum is also a multiple of n . This gives $a+c \equiv b+d \pmod{n}$. For the product, $ac - bd = (a-b)c + b(c-d)$. Since $a-b$ is a multiple of n , $(a-b)c$ is a multiple of n . Since $c-d$ is a multiple of n , $b(c-d)$ is a multiple of n . Their sum is a multiple of n , so $ac \equiv bd \pmod{n}$. Equivalently, $a \equiv b \pmod{n}$ implies $ac \equiv bc \pmod{n}$, and $c \equiv d \pmod{n}$ implies $bc \equiv bd \pmod{n}$; by transitivity, $ac \equiv bd \pmod{n}$. The statement about primality is not needed; this works for any positive integer n . So both of those congruences hold for any n .

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Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

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We wish you the very best on your exam journey. You've got this!

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