If we use an indirect proof strategy to prove that the product of an even number

Question 1 (5 points)

If we use an indirect proof strategy to prove that the product of an even number *a* with an odd number *b* equals an even number, then our proof must establish that

- ◯ *a* is odd and *b* is even.
- ◯ either *a* is odd or *b* is even.
- ◯ its not the case that either a is odd or b is even.
- ◯ none of the above

B? If you times an Even # with any number, it will ALWAYS be even. So either a or b will be even.
I'm not sure if B gives u the setup ur looking for in an indirect proof (indirect proof: assume ~q, show ~p) so answer **could be none of the above** (i believe correct answer would be a*b is odd to establish ~q) **or A** (~p = A is odd B is even)

It's none of the above. You have to assume not q. So we need to assume that the product of the two is an odd number and prove that A is even and B is odd. Not q isn't even an option here

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For a set-containment proof that

For a set-containment proof that

$$A \oplus (B \oplus C) = (A \oplus B) \oplus C,$$

when assuming

$$x \in A \oplus (B \oplus C),$$

how many different cases arise, where a single case assumes membership (or lack of membership) of x in each of the three sets A, B, and C? Hint: one case is

$$x \in A, x \in B, \text{ and } x \in C.$$

- ○ 3
- ○ 2
- ○ 4
- ○ 8

8?
Either 4 or 8 not sure
Can someone confirm?
^
^
^

Consider NFA 2 found in the Quiz 1 Supplement.

Consider NFA 2 found in the Quiz 1 Supplement. If the current subset state is {e,b} and input symbol 1 is read, then the next subset state is

- {a,b,c,d,e}
- {a,c,d,e}
- {a,b,e}
- {a,c,d,e,f}

{a,b,c,d,e}

If we have two numbers a and b, and use a proof by contradiction to prove that

If we have two numbers a and b, and use a proof by contradiction to prove that (a+b)/2 is less than or equal to either a or b. Then we may assume

- $$(a+b)/2 > a$$
  and
  $$(a+b)/2 > b$$
- $$(a+b)/2 < a$$
  or
  $$(a+b)/2 > b$$
- $$(a+b)/2 < a$$
  and
  $$(a+b)/2 > b$$
- $$(a+b)/2 > a$$
  or
  $$(a+b)/2 > b$$

Any progress on this one?
Im stuck stuck
For contradiction you want to start by assuming the opposite, So **demorgans** given it should be **(A+B)/2 > a AND (A+B)/2 > b**. I believe
I answered with the first option in this pic
*should be first option *

I think second no? You start with the opposite. So > then and

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If we want to find all solutions to the equation

If we want to find all solutions to the equation

$$|5x + 11| = |13x - 29|$$

then we must consider ____ possible cases.

- ○ 2
- ○ 8
- ○ 3
- ● 4

2 i think
So is it 4 or 2? Hehe
Whats the justification for either? Im saying 3 since x is either 0, positive or negative?
Yea what would be the 4th?
_there is no 4th
Cases: **5x+11 = 13x-29**, **-(5x+11) = 13x-29**, **5x+11 = -(13x-29)**, -(5x+11) = -(13x-29) -> 5x+11 = 13x-29… so only 3

Suppose we use an indirect proof strategy to prove the following statement.

Suppose we use an indirect proof strategy to prove the following statement. "If we record eight "happy" days during some month, then two of those happy days must fall on the same day of the week". Then our proof must establish that

- ○ a calendar week has more than seven days.
- ○ a calendar week has fewer than seven days.
- ○ we recorded fewer than eight happy days during the month.
- ○ we recorded more than eight happy days during the month.

I think 2?
Indirect proof is assuming not q. It would be if the opposite of after the “then” in the proof. So compliment of “two of those happy days must fall on the same day of the week”
I think you are correct in saying that it’s the second option in this pic

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If we use a proof by contradiction to prove that the square of an even number n is even.

Question 1 (5 points)

If we use a proof by contradiction to prove that the square of an even number n is even. Then in our proof we may assume.

- n is odd and n^2 is even
- n and n^2 are both even
- n is even and n^2 is odd
- n and n^2 are both odd

3rd option is the correct one

Correct, assume p and not q.

Consider the statement “for all” n >= L, there exist nonnegative integers

Question 1 (5 points)

Consider the statement "for all

$$n \geq L,$$

there exist nonnegative integers

$$k_1, k_2 \geq 0$$

for which

$$n = 5k_1 + 7k_2.$$

"Then the least L for which this statement is true is L = _____.

- 14
- 24
- 31
- 19

This one I believe is 14, k1 = 0, and k2 = 2. Still makes the statement true

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Let L be the language consisting of binary words whose decimal value is a multiple of 3 and contains the subword 010.

Question 1 (5 points) ✓ *Saved*

Let L be the language consisting of binary words whose decimal value is a multiple of 3 and contains the subword 010. For example, w = 10010 is in L since its decimal value is 18, but 110 is not in L since it does not have subword 010. Which of the following is a member of

$$L^*?$$

Hint: a word in L may have leading zeros.

- ( ) 01010101
- ( ) 0011100110101101
- (•) 101000110000100
- ( ) 11011101011

I highlighted the answer with it
Correct

If DMA M1 accepts language L and has 12 states, then we know for sure the there is a DFA M2 that accepts

Question 2 (5 points)

If DFA M1 accepts language L and has 12 states, then we know for sure that there is a DFA M2 that accepts

$$\overline{L}$$

and has no more than ____________ states.

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It's 12 right, or is it less?? Idk this one (I went with 12)

Suppose Languages L1 and L2 are defined over the same alphabet.

Question 2 (5 points)

Suppose languages L1 and L2 are defined over the same alphabet. If DFA M1 accepts L1 and has 12 states, while DFA M2 accepts L2 and has 5 states, then we know for sure that there is a DFA M that accepts

$$L1 \cap L2$$

and has no more than ____________ states.

Im guessing 5 since ∩ means that both sets need to have it
^ agreed

Are you sure it is 5 because in the notes for proposition 2, he got 8 states for M when m1 and m2 has 2 and 4 states respectively

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If DFA M1 accepts language L and has 12 states, then we know for sure that there is a DFA M2 that accepts

$$\overline{L}$$

and has no more than ____________ states.

Anyone know this??

An Instance of the task scheduling decision problem consists of a set whose members are pairs

Question 2 (5 points)

An instance of the Task Scheduling decision problem consists of a set whose members are pairs of numbers of the form (a,b), where

$$0 \leq a \leq b.$$

If this decision problem is represented as a language over alphabet

$$\Sigma,$$

then all of the following are necessary symbols of the alphabet, *except* for

- $$\leq$$

  (less than or equal to)
- 9 (the nine digit)
- , (comma)
- { (left brace)

Yes, it's the less than or equal to. Why would that be in the alphabet.
Where is the 9 from?

We may prove that

We may prove that

$$\sqrt[3]{7}$$

is irrational using a _____ proof strategy.

- ○ cases
- ○ proof by contradiction
- ○ indirect
- ○ direct

Proof by contradiction (i think wrong look below)

Why? Wouldnt it be direct?
I put direct because just work it out directly to show its irrational?
Yea direct is what I put

Khan acadamy has a video up where he proofs that sqrt(2) is irrational, but he's using proof by contradiction.
First 13 sec:
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:irrational-numbers/x2f8bb11595b61c86:proofs-concerning-irrational-numbers/v/proof-that-square-root-of-2-is-irrational
Contradiction is the correct answer
You can’t prove that this is irrational, but you can prove that it ISNT rational. Thus contradiction.
I remember him talking about this during first lec notes

If we know there’s an n >= 18 for which

If we know there's an

$$n \geq 18$$

for which

$$n = 4k_1 + 7k_2,$$
$$k_1, k_2 \geq 0,$$

then the equation

$$n + 1 = 4k_1 + 7k_2 + (8 - 7)$$

shows that it is also true for n+1, so long as

- n is not a multiple of 7.
- n is not a multiple of 4.
- n is a multiple of 7.
- n is a multiple of 4.

Help please lol
Not a multiple of 4?

An instance of some decision problem consists of a sequence

Question 4 (5 points)

An instance of some decision problem consists of a sequence

$$a_1, a_2, \ldots, a_n$$

of n integers (written in base 10). If a language L is used to represent the positive instances of this problem, then, assuming it uses an alphabet having minimum cardinality, the cardinality of the alphabet is equal to

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^ stuck on this one… thinking ‘n’ ?

In math, **0, 1, 2, 3, 4, 5, 6, 7, 8, and 9** are base ten numerals, cardinality is just the size of the alphabet. It’s 10 I believe. If you were finding the Cardinality of L, then it would be n

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Let L be the language accepted by DFA 1 in the Quiz 1 Supplement. Then all of the following is true about L except

Let L be the language accepted by DFA 1 in the Quiz 1 Supplement. Then all of the following is true about L *except*

- $$\text{if } w \in L \text{ then } 0^m w \in L,$$
  for all m >= 0.
- $$\text{if } w \in L \text{ then } w0^m \in L,$$
  for all m >= 2.
- if w is accepted by L, then w = u1v, for some u and v in
  $$\{0, 1\}^*.$$
- that L is regular.

I think it’s the first option