michael Chillemi test 2 Discrete math

45%

1.

direct proof

if n and m are odd

the n·m is odd

-1 n and m are ~~real~~ numbers

suppose n & m are odd Then ∃ integers a & b such that

$n = 2a+1$

$m = 2b+1$

$n \cdot m = (2a+1)(2b+1)$

$n \cdot m = 4ab + 2a + 2b + 1$

$n \cdot m = 2(2ab + a + b) + 1$

So $2k+1$ is an odd integer

$n \cdot m = 2k+1$

$k = 2ab + a + b$

So n · m is odd.

2. Suppose n is not an odd number

So ~~...~~ n is even

a) $n = 2k+4$ why?

$n^2 = 4k^2 + 16 = 4(k^2+4)$ -1

So it is even

this gives that if n^2 is odd then n is odd.

b) Suppose n is even and k is an integer -3

$n^2 = (2k+4)$

~~$n^2 = 2(k+8)$~~ $n = (2k+4)^2$

~~$n = 2k(k+2)^2$~~ $n = (2k+4)(2k+4)$

~~...~~ $2(k+2)\,2(k+2)$

$(k+2)(k+2)$

k^2+4k+4

Condradiction!

Because the statement is fals

n^2+4 is odd.

3. $n^2 + 2 \geq 2$ if $2 \leq n \leq 4$

suppose n is ~~[illegible]~~ 3

$3^3 + 2 \geq 2$

$9 + 2 \geq 2$

$11 \geq 2$ this is true

-3

so $n^2 + 2 \geq 2$ if the condition is $2 \leq n \leq 4$. I used a direct proof to prove it.

4. $n^2+2 \geq 2^n$

-2

5. $3n^2+n+14$

Case 1 ~~a~~ Suppose n is even $n=2k$

$6k+2k+14 = 8k+14 = 2(4k+7)$

So $3n^2+n+14$ is even for all integers n

Case 2 Suppose n is odd
$n=2k+1$

$3(2k+1)+2k+1+14 = 6k+2k+14$

~~$6k+3+2k+1+14+6k+2k+14$~~

$6k+3+2k+1+14 = 6k+2k+14$

can't see

6. 340 mod 12

a)

$$\begin{array}{r} 28 \\ 12\overline{)340} \\ 24 \\ \hline 100 \\ 96 \\ \hline 4 \end{array}$$

340 mod 12 = 4 ✓

b) -230 mod 25

$-5 \equiv 20 \mod 25$

$$\begin{array}{r} -9 \\ 25\overline{)-230} \\ +225 \\ \hline -5 \end{array}$$

$-230 \mod 25 = \cancel{-9}$ (-1)

Q. 7.

$x^2 \cdot x = -10$ and 7 -3

That's not what the question asked.

-3

-6

$$7 \overline{\smash{)}-10}$$ -1, -3 ✓

$$\frac{7}{x^2 + 10}$$

-3

$\overset{-5}{8}$? $\overset{-3}{9}$? $\overset{-6}{10}$?

11. 23 binary

$\cancel{2^5}$	1	0	1	1	1
	2^4	2^3	2^2	2^1	2^0
$\cancel{32}$	16	8	4	2	1

$16\overline{)23}^{\,1}$
-16
7

$4\overline{)7}^{\,1}$
-4
3

$2\overline{)3}^{\,1}$
2
1

12. 51751 as hexadecimal

$51751 = CA27_{16}$

$16\overline{)51751}$ = 3234.4375

C	A	2	7
16^3	16^2	16^1	16^0

$3234.4375 - 3234$

$= 0.4375 \times 16$

$= 7$

I cannot see anything on this page

13. -3

14 -3

15.

a) ~~$26^6 \cdot 26^6 \cdot 10^6$~~ $= 9.5428956661E22$ $(26+26+10)^6$

$= 95,428,956,660,000,000,000,000$ Combinations

-3

b) $\underline{26}\ \underline{26}\ \underline{25}\ \underline{24}\ \underline{10}\ \underline{9}$

$= 40,560,000$ possible Passwords

16.

$C(7,3)$

$= \frac{7!}{3!(7-3)!} = \frac{7!}{3!\,4!}$ $\frac{7 \cdot \cancel{6} \cdot 5 \cdot \cancel{4} \cdot \cancel{3}!}{\cancel{3} \cdot \cancel{2} \cdot \cancel{3} \cdot \cancel{2} \cdot 1}$

$= 7 \cdot 5 = 35$ ✓

17? -3 18? -3 19? -3

20.

5 cookies

7 kinds

first always chocolate

$C(7+4-1, 4)$

$\frac{10!}{7!\,4!}$

$\frac{10 \cdot 9 \cdot \cancel{8} \cdot \cancel{7!}}{\cancel{7!}\, \cancel{4} \cdot 3 \cdot \cancel{2} \cdot \cancel{1}}$

$\frac{90}{3}$

$= \cancel{30}$ combinations

21

a)

D # 1 D # 2

1 2 3 4 5 6

$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$

1 2 3 4 5 6

$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$

$\frac{1}{6} \cdot \frac{1}{6}$ 2

P(rolling at least a 4) is ?

b)

−4

c $P(1,4) + P(2,3) + P(4,1) + P(3,2)$

$\frac{1}{6} \cdot \frac{1}{6} + \frac{1}{6} \cdot \frac{1}{6} + \frac{1}{6} \cdot \frac{1}{6} + \frac{1}{6} \cdot \frac{1}{6}$

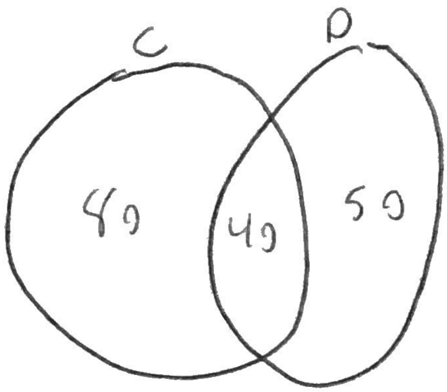
$\frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} = \frac{4}{36} \div \frac{2}{2} \quad \frac{2}{18} \div \frac{2}{2} \quad \frac{1}{9}$

22. 200 people

120 Coke

90 pepsi

40 both



$80 + 40 + 50 = 170$

$\frac{170}{200} \frac{\div 10}{\div 10} \quad \frac{17}{20}$

a) P(someone who likes coke and pepsi)

$\frac{17}{20} = 0.85$

b)

$200 - 170 = 30$

$\frac{30}{200} \frac{\div 10}{\div 10} \quad \frac{3}{20}$

P(picking someone that likes niether)

$\frac{3}{20} = 0.15$

23.

a) the probability of having a boy is

$\cancel{\frac{1}{2} = 0.5}$ P

$\frac{2}{3}$

b the probability of having a ~~boy~~ girl is

$\cancel{\frac{1}{2} = 0.5}$

$\frac{1}{3}$

-2

c) $\frac{B}{C_1}$ $\frac{B}{C_2}$, $\frac{G}{C_1}$ $\frac{G}{C_2}$, $\frac{B}{C_1}$ $\frac{G}{C_2}$, $\frac{G}{C_1}$ $\frac{B}{C_2}$

D) $\frac{B}{\text{Given}}$ $\underline{\quad B \quad}$ $\frac{B}{\text{Given}}$ $\underline{\quad G \quad}$

-3

P(having two boys) is $\cancel{\frac{1}{2}} = 0.5$

2th H T

~~H~~ <u>H</u>, H, T, T, H, T

T, H = $\frac{2}{4}$ chances

when flipping 2 coins the probability = $\frac{1}{4}$ is ~~[illegible]~~ independent because when you flip one coin it does not ~~[illegible]~~ affect the outcome of the second coin