

Solutions to Multiple Choice Questions

Problem 1

Problem 1

Clyde has two fair 5-sided dice.

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

6 happens when roll is: $(1, 5)$ or $(2, 4)$ or $(3, 3)$ or $(4, 2)$ or $(5, 1)$.

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

6 happens when roll is: (1, 5) or (2, 4) or (3, 3) or (4, 2) or (5, 1).

Each of those pairs has prob $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$.

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

6 happens when roll is: (1, 5) or (2, 4) or (3, 3) or (4, 2) or (5, 1).

Each of those pairs has prob $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$.

Hence the prob is $5 \times \frac{1}{25} = \frac{1}{5}$.

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

6 happens when roll is: (1, 5) or (2, 4) or (3, 3) or (4, 2) or (5, 1).

Each of those pairs has prob $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$.

Hence the prob is $5 \times \frac{1}{25} = \frac{1}{5}$.

- a) $1/10$ b) $1/5$ c) $3/10$ d) $2/5$ e) $1/2$

Problem 1

Clyde has two fair 5-sided dice.

Clyde rolls both dice. Want probability that the sum is 6.

6 happens when roll is: (1, 5) or (2, 4) or (3, 3) or (4, 2) or (5, 1).

Each of those pairs has prob $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$.

Hence the prob is $5 \times \frac{1}{25} = \frac{1}{5}$.

a) $1/10$ b) $1/5$ c) $3/10$ d) $2/5$ e) $1/2$

So the answer is b) $1/5$.

Problem 2

Problem 2

Bill has two loaded 5-sided dice.

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

(2, 2) has prob $\frac{1}{6} \times \frac{1}{6} = \frac{2}{12} \times \frac{1}{6} = \frac{1}{12} \times \frac{1}{3}$

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

(2, 2) has prob $\frac{1}{6} \times \frac{1}{6} = \frac{2}{12} \times \frac{1}{6} = \frac{1}{12} \times \frac{1}{3}$

(3, 1) has prob $\frac{1}{4} \times \frac{1}{12} = \frac{3}{12} \times \frac{1}{12} = \frac{1}{12} \times \frac{1}{4}$.

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

(2, 2) has prob $\frac{1}{6} \times \frac{1}{6} = \frac{2}{12} \times \frac{1}{6} = \frac{1}{12} \times \frac{1}{3}$

(3, 1) has prob $\frac{1}{4} \times \frac{1}{12} = \frac{3}{12} \times \frac{1}{12} = \frac{1}{12} \times \frac{1}{4}$.

Sum is $\frac{1}{12}(\frac{1}{4} + \frac{1}{3} + \frac{1}{4}) = \frac{1}{12} \times \frac{5}{6} = \frac{5}{72}$.

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

(2, 2) has prob $\frac{1}{6} \times \frac{1}{6} = \frac{2}{12} \times \frac{1}{6} = \frac{1}{12} \times \frac{1}{3}$

(3, 1) has prob $\frac{1}{4} \times \frac{1}{12} = \frac{3}{12} \times \frac{1}{12} = \frac{1}{12} \times \frac{1}{4}$.

Sum is $\frac{1}{12}(\frac{1}{4} + \frac{1}{3} + \frac{1}{4}) = \frac{1}{12} \times \frac{5}{6} = \frac{5}{72}$.

a) $1/36$ b) $1/24$ c) $1/18$ d) $5/72$ e) $1/12$

Problem 2

Bill has two loaded 5-sided dice.

$P(1)=1/12$, $P(2)=1/6$, $P(3)=1/4$, $P(4)=5/12$, $P(5)=1/12$.

What is the prob of getting a 4?

A 4 happens when roll is: (1, 3) or (2, 2) or (3, 1).

(1, 3) has prob $\frac{1}{12} \times \frac{1}{4}$

(2, 2) has prob $\frac{1}{6} \times \frac{1}{6} = \frac{2}{12} \times \frac{1}{6} = \frac{1}{12} \times \frac{1}{3}$

(3, 1) has prob $\frac{1}{4} \times \frac{1}{12} = \frac{3}{12} \times \frac{1}{12} = \frac{1}{12} \times \frac{1}{4}$.

Sum is $\frac{1}{12}(\frac{1}{4} + \frac{1}{3} + \frac{1}{4}) = \frac{1}{12} \times \frac{5}{6} = \frac{5}{72}$.

a) $1/36$ b) $1/24$ c) $1/18$ d) $5/72$ e) $1/12$

So the answer is d) $5/72$.

Problem 3

Problem 3

How many complex roots does the equation $z^{100} = 1$ have

Problem 3

How many complex roots does the equation $z^{100} = 1$ have

The equation $z^n = 1$ always has n complex roots.

Problem 3

How many complex roots does the equation $z^{100} = 1$ have

The equation $z^n = 1$ always has n complex roots.

They are the 100 equally spaced points on the complex unit circle.

Problem 3

How many complex roots does the equation $z^{100} = 1$ have

The equation $z^n = 1$ always has n complex roots.

They are the 100 equally spaced points on the complex unit circle.

a) 0 b) 1 c) 2 d) 50 e) 100

Problem 3

How many complex roots does the equation $z^{100} = 1$ have

The equation $z^n = 1$ always has n complex roots.

They are the 100 equally spaced points on the complex unit circle.

a) 0 b) 1 c) 2 d) 50 e) 100

So the answer is e) 100.

Problem 4

Problem 4

How many real roots does the equation $z^{100} = 1$ have

Problem 4

How many real roots does the equation $z^{100} = 1$ have

The only real roots that $z^n = 1$ can have are 1 and -1 .

Problem 4

How many real roots does the equation $z^{100} = 1$ have

The only real roots that $z^n = 1$ can have are 1 and -1 .

1 and -1 are both roots, so there are 2 real roots

Problem 4

How many real roots does the equation $z^{100} = 1$ have

The only real roots that $z^n = 1$ can have are 1 and -1 .

1 and -1 are both roots, so there are 2 real roots

a) 0 b) 1 c) 2 d) 50 e) 100

Problem 4

How many real roots does the equation $z^{100} = 1$ have

The only real roots that $z^n = 1$ can have are 1 and -1 .

1 and -1 are both roots, so there are 2 real roots

a) 0 b) 1 c) 2 d) 50 e) 100

So the answer is c) 2.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$ NO- Since $p_1 = 0$ would need all $p_i = 0$.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$ NO- Since $p_1 = 0$ would need all $p_i = 0$.

d) $(\frac{1}{10}, \frac{2}{10}, \frac{4}{10}, \frac{2}{10}, \frac{1}{10})$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$ NO- Since $p_1 = 0$ would need all $p_i = 0$.

d) $(\frac{1}{10}, \frac{2}{10}, \frac{4}{10}, \frac{2}{10}, \frac{1}{10})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$ NO- Since $p_1 = 0$ would need all $p_i = 0$.

d) $(\frac{1}{10}, \frac{2}{10}, \frac{4}{10}, \frac{2}{10}, \frac{1}{10})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

e) $(\frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6})$

Problem 5

(This is the question as I intended. The one given out had a mistake in it and will not count.)

A 5-sided die is a tuple $(p_1, p_2, p_3, p_4, p_5)$

Which of the following 5-tuples represents a nice 5-sided die?

Recall that a **nice die** is one which is symmetric and every element is either p_1 or 0.

We look at each choice of die and see which one is nice and, for those that aren't nice, why they aren't.

a) $(\frac{1}{3}, 0, \frac{1}{3}, 0, \frac{1}{3})$ YES

b) $(\frac{1}{3}, \frac{1}{6}, 0, \frac{1}{6}, \frac{1}{3})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

c) $(0, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, 0)$ NO- Since $p_1 = 0$ would need all $p_i = 0$.

d) $(\frac{1}{10}, \frac{2}{10}, \frac{4}{10}, \frac{2}{10}, \frac{1}{10})$ NO- $p_2 \neq p_1$ and $p_2 \neq 0$.

e) $(\frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6})$ NO- the numbers add up to $\frac{6}{5} > 1$.

Problem 6

Problem 6

Clyde has two 4-sided dice.

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with $(1,3,5,7)$

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

How many ways can he get a 9

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

How many ways can he get a 9

The only ways to get a 9 are (1,8), (3,6), (5,4), (7,2).

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

How many ways can he get a 9

The only ways to get a 9 are (1,8), (3,6), (5,4), (7,2). 4 ways.

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

How many ways can he get a 9

The only ways to get a 9 are (1,8), (3,6), (5,4), (7,2). 4 ways.

a) 1 b) 2 c) 3 d) 4 e) 5

Problem 6

Clyde has two 4-sided dice.

The first one labels the sides with (1,3,5,7)

The second one labels the sides with (2,4,6,8)

Clyde rolls the two dice.

How many ways can he get a 9

The only ways to get a 9 are (1,8), (3,6), (5,4), (7,2). 4 ways.

a) 1 b) 2 c) 3 d) 4 e) 5

So the answer is d) 4.