

Name, discipline and subfield? Joshua Corona – Comparative Politics/International Relations

What are you hoping to gain from this course? Refresh skills I haven't used in a while and to work out my brain a bit to be ready for the program after a few months of being out of practice. Hopefully learn new things!

Questions

1. Basics

1. (a) Explain the significance or use of the following symbols:

i. Π (note: different from π) – the product

ii. Σ – sigma/the sum

in a series

2. (b) Solve: (no need to simplify but show steps/work if possible)

1. $4 \geq x - 7$

1. $0 \geq x - 7 - 4$

2. $0 \geq x - 11$

3. $11 \geq x$

ii. $-9x + 2 > 3$

1. $-9x > 1$

2. $x > 1/-9$

iii. $|x - 2| \leq 2$

iv. $2e^{6x} = 18$

v. $e^{x^2} = 1$

vi. $\ln(x^2) = 5$

10

vii. $n = 13 + n$

6. $4!$

1. $(4 \times 3 \times 2 \times 1)$

2. 24

ix. $(x^4y - 3)^3$

6.75
1.5

6.75 + 7 = 13.75

0.25

$$x^2y^3$$

(c) Factor

$$m^2 + 3m + 2 = (m+2)(m+1)$$

$$x^2 + 5x + 6 = (x+2)(x+3)$$

$$x^2 + x = (x+1)(x+0)$$

$$x(x+1)$$

2. Set Theory

(a) Explain the meaning of the following symbols:

\in - an element in the set

\forall - "for all" elements in the set, the symbol is the universal qualifier

(b) Suppose $A = \{3, 4, 5\}$, $B = \{\text{hat, triangle, forklift}\}$ and $C = \{x \mid x \text{ is a natural number} \mid x > 3 \text{ and } x < 9\}$

i. What is $A \cup B$?

ii. Write the elements of C

iii. What is $A \cap C$?

3. Functions & Pre-Calculus

(a) What is a continuous function?

(b) Draw an increasing function.

(c) What is a tangent line? What does it do?

4. Matrix Algebra

(a) What experience do you have with matrix algebra?

(b) Give an example of a 3×4 matrix:

5. Calculus

(a) what is the derivative of $4x$? 4

(b) calculate the derivative of $3m^2 - 8m + 5$

(c) calculate the integral $\int_0^5 (x^3 + 0.5x^2 + 5x) dx$

(d) calculate the integral $\int e^x dx$

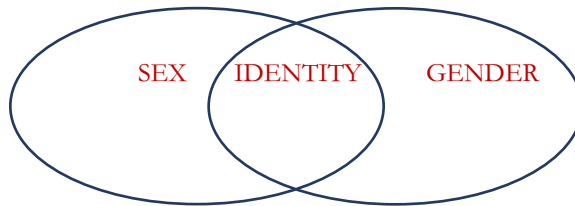
6. Probability

(a) What does $P(A)$ mean? The probability of some event (A)

(b) What is an independent event? An event that isn't affected by other events, so the $P(A)$ does not change if B occurs or not **doesn't change $P(B)$**

(c) Define or explain Bayes' Rule: The probability of an event happening given the occurrence of other phenomena that may be related to it. $P(A|B) = P(B|A) \times P(A)/P(B)$

(d) What is a Venn diagram? Give, draw and label an example.



7. Statistics

(a) What is the difference between continuous and discrete variables? Continuous variables do not have finite limits – like time or democracy. Discrete variables are countable – like the number of cars in a driveway. **X**

(b) What is a probability mass function? (define, explain, give an example)