QUESTION 1

Let:

A = the least composite number

B = the least common multiple of 189 and 69

C = the greatest common factor of 371 and 1113

D = the truth value of the following statement: 91 is the smallest prime number under 100. (If the statement is true let D = 1, if the statement is false let D = -1)

Find $\dfrac{B+C}{A} \times 2D$

QUESTION 2

Tanmay Jr. is a very muscular person, but getting his physique was not easy. One of the tricks he used before his workouts was to drink a pre-workout protein smoothie in order to energize his workout which allowed him to maximize his muscle gains. The recipe for Tanmay's protein smoothie contains the following ingredients: 1 frozen banana (120 grams), vanilla protein powder (25 grams), peanut butter (30 grams), almond milk (180 grams), and ice (120 grams). Jonathan decides he wants to use the same recipe; however, to satisfy his calorie goals he wants to alter the ingredients in a way that allows him to benefit the most. Let:

A = the number of additional grams of vanilla protein powder that is needed to modify the original recipe with the criterion: create a mixture consisting of 10% vanilla protein powder

B = the number of additional grams of peanut butter that is needed to modify the original recipe with the criterion: create a mixture consisting of 11% peanut butter

Find $\frac{A}{B}$

QUESTION 3

Bilal and Jonathan have a passion for working out and their favorite exercise is the push-up. Each of them have developed a sequence to determine how many push-ups they will do everyday. In the duration of the first 3 days, Bilal completed 23 push-ups on the first day, 42 push-ups on the second day, and 61 push-ups on the third day; Jonathan completed 17 push-ups on the first day, 34 push-ups on the second day, and 68 push-ups on the third day. Let:

A = the number of push-ups Bilal does on the 17th day

B = the number of total push-ups Bilal does in the duration of 17 days

C = the positive difference in the number of push-ups Bilal and Jonathan do on the 6th day

D = the <u>total</u> amount of push-ups that both Bilal and Jonathan have completed in the duration of the first week

Find $\dfrac{B+D+330}{A+C}$

QUESTION 4

A long time ago in a galaxy far, far away... there existed a tiny planet called Simia and within this planet monkeys and ostriches coexisted. Based on recent scientific discoveries, we have realized that this planet had a total population of 1885 animals with a combined total of 5066 legs. Assuming every monkey has 4 legs and every ostrich has 2 legs. Let:

A = the number of monkeys on planet Simia

B = the number of ostriches on planet Simia

On planet Simia, the monkeys and ostriches have lived in harmony for many years now and recently they have developed an alien civilization. The currencies used in planet Simia are Jums, Jings, Jams, and Jongs. Five Jongs in this planet are worth the same amount as six Jams. Three Jams are worth the same amount as three Jings. Two Jings are worth the same amount as 45 Jums. Let:

C = the number of Jongs that are worth the same amount as 81 Jums

D = the number of Jums that are worth the same amount as a Jong

Find $A + B + C + D$

QUESTION 5

If $f(x) = x^3 - 6x^2 + 5x + 12$, let:

A = the degree of $f(x)$

B = the sum of the roots of $f(x)$

C = the product of the roots of $f(x)$

D = the sum of the reciprocals of the roots of $f(x)$

Find $(2A + B + C) \times D$

QUESTION 6

Sukeerth, Rishil, and Vibav have qualified as a trio for the final round of the International Pie Off (IPO). This is a global pie eating tournament to see which team can eat the most pies in 80 minutes. The competition rules are that for the first 30 minutes of the tournament, one competitor from each team will individually eat as many pies as possible. After that 30 minute mark, the individual contestant will stop eating pies and the remaining teammates of the trio (who did not participate in the first 30 minutes) will immediately start eating pies till the end of the time block. At the end, the judges will count the number of whole pie portions each team had collectively finished and multiply that number by ten to determine each team's score. Assuming Sukeerth can eat 5 pies in 9 minutes, Rishil can eat 7 pies in 15 minutes, and Vibav can eat 13 pies in 20 minutes. If Sukeerth competes for the first 30 minutes, and if Vibav and Rishil competes for the remainder of the contest, what is the team's score?

QUESTION 7

Let:

A = the number of ways to choose a group of 4 students from a classroom of 12 students

B = the number of distinct ways to arrange the word "BANANA"

C = the number of ways to arrange 6 people around a table

D = the number of distinct ways to arrange the word "SEVEN" so that S and V aren't next to each other

Find $A \times \dfrac{C}{B} + D$

QUESTION 8

Himank is starving, so he decides to go to a fancy vegetarian restaurant. His options are limited to either Chick-fil-a or McDonald's, for he only eats the highest quality vegetarian food. Assuming all these locations were plotted on a Cartesian plane, Himank's house would be located at the point (7,3), Chick-fil-a would be located at (-53,14), and McDonald's would be located at the point (27,24). Let:

A = the distance from Himank's house to Chick-fil-a

B = the distance from Himank's house to McDonald's

C = the sum of the slope and y-intercept of the line containing the locations of Himank's house and Chick-fil-a

D = the sum of the slope and y-intercept of the line containing the locations of Himank's house and McDonald's

Find $A + B + (C + D) \times 10$

QUESTION 9

Let:

A = the perimeter of a square with length 14

B = the area of a circle with diameter 9

C = the volume of a cylinder with radius 3, and height 18

D = the surface area of a sphere with radius 4

Find $A + \dfrac{C}{B} + \dfrac{D}{2\pi}$

QUESTION 10

Let:

A = the numerical value of XIV

B = the numerical value of XCVIII

C = the numerical value of CDXIV

D = the numerical value of LXIX

Find $(A + B) \times \dfrac{C}{D}$

QUESTION 11

Stephen Curry is considered one of the greatest basketball players of all time. The following table shows his seasonal statistics in the National Basketball Association (NBA).

Stephen Curry's Stats	
NBA Season	Points
2016-2017	2000
2017-2018	1400
2018-2019	1900
2019-2020	100
2020-2021	2000
2021-2022	1600

Let:

A = the median of the points Stephen Curry scored per NBA season

B = the range of the points Stephen Curry scored per NBA season

C = the arithmetic mean of the points Stephen Curry scored per NBA season

D = the geometric mean of the data set: 20, 14, 19

Find $\dfrac{C}{B-A}+D$

QUESTION 12

Rishi loves watching movies, especially superhero films. In fact, he has a whole collection of 30 total DVDs: 9 of them are Spider-Man movies, 3 are Thor movies, 3 are Iron Man movies, 9 are Batman movies, and 6 are Captain America movies. (Assume for the individual parts that drawing a DVD from the collection is at random.) Let:

A = the probability of drawing a Batman movie from Rishi's collection

B = the probability of drawing either a Thor or Captain America movie from Rishi's collection

C = the probability of not drawing a Spider-Man movie from Rishi's collection

D = the probability of drawing an Iron Man movie from Rishi's collection

Find $(A + B + C + D) \times 30$

QUESTION 13

Tick, Tock, the test is almost up. Let:

A = the measure of the smaller angle made by the hour hand and minute hand of an analog clock at 12:30

B = the measure of the acute angle made by the hour hand and minute hand of an analog clock at 2:20

C = the measure of the larger angle made by the hour hand and minute hand of an analog clock at 9:50

Find $C - A + B$

QUESTION 14

Let:

A = the fractional representation of 0.45

B = the fractional representation of $0.\overline{3}$

C = the fractional representation of $1.2\overline{9}$

Find $A + B + C$. Express your answer as a common fraction.