Howard University Math Department

1. (15 points) Find the sum of the first 20 terms $S(20) = a_1 + a_2 + ... + a_{20}$ of the following geometric sequence. You must use the formula for the sum of a geometric sequence. You can leave answer as a fraction but simplify as much as is possible. Can you find the infinite sum? if so, what is it?

$$\frac{1}{3}, \frac{2}{9}, \frac{4}{27}, \frac{8}{81}, ...$$

Solution:

$$S(n) = a\frac{1-r^n}{1-r} \; ; \; a = \frac{1}{3}, r = 2/3, n = 20.$$

$$S(20) = \frac{1}{3}\left(\frac{1-\left(\frac{2}{3}\right)^{20}}{1-\frac{2}{3}}\right) = \frac{1}{3}\left(\frac{1-\left(\frac{2}{3}\right)^{20}}{\frac{1}{3}}\right) = 1 - \left(\frac{2}{3}\right)^{20}$$

Infinite sum can be found because common ratio has absolute value less than 1.

It equals $a/(1-r) = (1/3)/(1-(2/3)) = 1$.

2. (Extra credit 5 points) Name five areas in life that rely heavily on statistics.

Solution:

Sports, Finance, Medicine, Politics, Climate and Weather forecasting.

3. (15 points) Make a stem-leaf table, frequency table, and a line graph (draw by hand) for the following data:

The five year averages of arctic ice amounts from 1980 to 2024 (average of ice amounts from 80 to 84, 85 to 89, etc.,) are :

$$7.05, 6.93, 6.54, 6.39, 6.00, 4.99, 4.49, 4.42, 4.36$$

What is happening to the arctic ice over the years?

Solution:

Stem leaf table:

7: 0.05

6: 0.93, 0.54, 0.39, 0.00

4: 0.99, 0.49, 0.42, 0.36

Frequency table:

7 : | Frequency = 1

6: |||| Frequency = 4

4: |||| Frequency = 4