Quiz 4 Solution

1. (5 points) What is the limit of the sequence $a_n = \dfrac{n}{3n^2+1}$? Show your work.

   Solution:
   $$\lim_{n\to\infty} a_n = \lim_{n\to\infty} \frac{n}{3n^2+1} = \lim_{n\to\infty} \frac{1/n}{3+1/n^2} = 0$$

2. Consider a geometric series $\sum_{n=1}^{\infty} \frac{2^n}{3^{n+1}}$.

   (a) (3 points) Find the 3rd partial sum s_3 of the series. You do not need to simplify your answer.

   Solution: $s_3 = \dfrac{2}{3^2} + \dfrac{2^2}{3^3} + \dfrac{2^3}{3^4}$

   (b) (4 points)Determine the sum of the series.

   Solution:
   $$\sum_{n=1}^{\infty} \frac{2^n}{3^{n+1}} = \sum_{n=1}^{\infty} \frac{2}{3^2}\left(\frac{2}{3}\right)^{n-1} = \frac{2}{3^2}\sum_{n=0}^{\infty}\left(\frac{2}{3}\right)^{n} = \frac{2}{3^2}\frac{1}{1-2/3} = \frac{2}{3}$$