Print your name: _____

Answer each question completely. You must justify your answers to get credit. Even a correct answer with no justification will get no credits. Each question is worth 5 points.

1. Consider the series $\sum_{n=0}^{\infty} \frac{2^n}{\pi^{n+1}}$. Does it converge or diverge? If it converges, find the sum and if it diverges, explain why.

$\sum_{n=0}^{\infty} \frac{2^n}{\pi^{n+1}} = \sum_{n=0}^{\infty} \frac{1}{\pi}\left(\frac{2}{\pi}\right)^n$ geometric series

with $a = 1/\pi$, $r = 2/\pi < 1$

So it converges. Its value is:

$$\sum_{n=0}^{\infty} \frac{1}{\pi}\left(\frac{2}{\pi}\right)^n = \frac{1/\pi}{1-2/\pi} = \frac{1}{\pi - 2}$$

2. Consider the series $\sum_{n=0}^{\infty} (-1)^n \frac{n^2+4}{2n^2-1}$. Does it converge or diverge? If it converges, find the sum and if it diverges, explain why.

$$\lim_{n\to\infty} (-1)^n \frac{n^2+4}{2n^2-1} = \left(\lim_{n\to\infty} (-1)^n\right)\left(\lim_{n\to\infty} \frac{n^2+4}{2n^2-1}\right)$$

$$= \left(\lim_{n\to\infty} (-1)^n\right)\left(\lim_{n\to\infty} \frac{1+4/n^2}{2-1/n^2}\right) = \frac{1}{2} \cdot \lim_{n\to\infty} (-1)^n$$

$= \frac{1}{2}$

limit does not exist!

so by the divergence test

$\sum_{n=0}^{\infty} (-1)^n \frac{n^2+4}{2n^2-1}$ diverges