

Answer the following questions clearly and completely. You must provide work clearly justifying your solution.

(10 points) 1. Determine whether the following infinite series converges.

$$\sum_{k=1}^{\infty} \frac{\sqrt{2k + \sin(k^2)}}{\sqrt{k^5 + 1}}$$

(10 points) 2. If the following improper integral converges, find its exact value.

$$\int_2^4 \frac{x}{(x^2 - 4)^{1/2}} dx$$