Date: February 16, 2024, Friday NAME:.....

STUDENT NO:.....

DEPARTMENT:.....

Math 102 Spring 2024 – QUIZ # 2

Let $f(x) = \frac{x}{x^4+1}$ and $a_n = f(n)$ for all $n \geq 1$. Notice we have

$$\frac{d}{dx}(f(x)) = \frac{1-3x^4}{(x^4+1)^2} \quad \text{and} \quad \int f(x)dx = \frac{1}{2}arctan(x^2) + C.$$

Are the following statements true or false. Explain your answers. Your answers must start with the word "TRUE" or "FALSE".

a) f is positive on $[1, \infty)$.

b) f is continuous on $[1, \infty)$.

c) f is decreasing on $[1, \infty)$.

d) $\int_1^\infty f(x)dx$ is convergent.

e) $\sum_{n=1}^{\infty} a_n$ is convergent. (For this part, you **must** use integral test.)