1.

$$\int \frac{1}{x^2\sqrt{1+x^2}}dx$$

2. True/False: If $\lim_{x\to\infty} f(x) = 0$, then $\int_1^\infty f(x)dx$ converges.

3. Determine if the following integral converges or diverges:

$$\int_4^\infty e^{-\frac{x}{2}}\,dx.$$

4. Define a piecewise function $f(x)$ on the interval $[0, 2]$ by

$$f(x) = \begin{cases} 1 \text{ if } 0 \le x \le 1 \\ 0 \text{ if } 1 < x \le 2. \end{cases}$$

Calculate L_2, R_2, M_2, and T_2.