10. [8 points] Two functions, \( f(x) \) and \( g(x) \) are continuous and differentiable for all \( x > 2 \), and:

- \( \lim_{x \to 2^+} f(x) = \infty \) (this means that \( f(x) \) has a vertical asymptote at \( x = 2 \)),
- \( \frac{d}{dx} \left( \frac{3 - 3 \cos(\pi x)}{g(x)} \right) = f(x) \) for all \( x > 2 \),
- \( g(3) = 4 \),
- \( \lim_{x \to 2^+} g(x) = 0 \), and
- \( \lim_{x \to 2^+} g'(x) = 10 \).

Determine whether the following integral converges or diverges, and if the integral converges, give its exact value. Be sure to show all work and indicate any theorems you use.

\[
\int_{2}^{3} f(x) \, dx
\]

**Answer (Circle one):**  
Diverges  
Converges to: ______

**Justification:**