

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

- $\lim_{x \rightarrow 2+} f(x) = \infty$ (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 $x > 2$,
- $g(3) = 4$,
- $\lim_{x \rightarrow 2+} g(x) = 0$, and
- $\lim_{x \rightarrow 2+} g'(x) = 10$.

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: