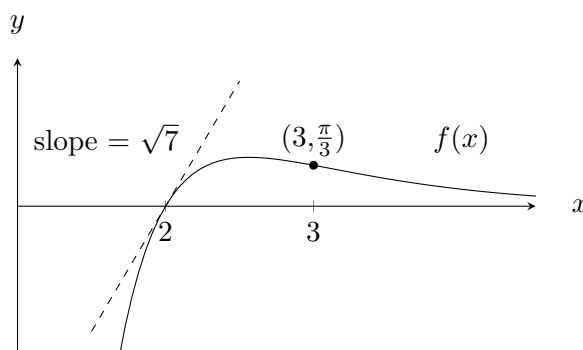**6.** [12 points] Below is the graph of a function $f(x)$. The function $f(x)$ is positive for $x > 2$. The x-axis is a horizontal asymptote of $f(x)$ as $x \to \infty$. The dashed line is the tangent line to $f(x)$ at $x = 2$, and its slope is $\sqrt{7}$.

a. [2 points] Compute $\displaystyle \lim_{x \to 2^+} \tan^{-1} \frac{1}{f(x)}$.

(*Hint:* Recall that $\displaystyle \lim_{z \to \infty} \tan^{-1} z = \frac{\pi}{2}$ and $\displaystyle \lim_{z \to -\infty} \tan^{-1} z = -\frac{\pi}{2}$.)

b. [3 points] Compute $\displaystyle \lim_{x \to 2^-} \frac{f(x)}{e^x - e^2}$.

c. [7 points] **Compute** the value of the following improper integral if it converges. If it does not converge, use a **direct computation** of the integral to show its divergence. Be sure to show your full computation, and be sure to use **proper notation.**

$$\int_3^\infty \frac{f'(x)}{(f(x))^{2/3}} \, dx$$