Math 185 Quiz 4

Don't forget to write down clearly your **Name**: and **ID number:**

1. True or False (10 points). Mark "T" (True) in front of a correct statement and "F" (False) in front of a wrong one.

____ A Taylor series is also a Laurent series.

____ The function $f(z) = z^2 + 1/z$ has a complex primitive function on $\mathbb{C}\backslash\{0\}$.

____ The Laurent series expansion for $f(z) = \sin(\frac{1}{z})$ converges everywhere on $\mathbb{C}\backslash\{0\}$.

____ The function $f(z) = \cos z$ has both 2π and $2\pi i$ as periods.

____ The function $f(z) = e^z$ extends to be an analytic function on the extended complex plane $\mathbb{P} := \mathbb{C} \cup \{\infty\}$.

2. Laurent series (10 points). Consider the meromorphic function

$$f(z) = \frac{z + \pi}{\sin z}.$$

(a) Find all the singularities of $f(z)$ on $\mathbb{C}$. Specify whether they are removable, of pole type or essential.

(b) Find the principal part of $f(z)$ at $z = \pi$, and compute the residue at that point.