Let $\gamma : z(t) = 2e^{it} + 1, 0 \leq t \leq 2\pi$. Evaluate the integrals in a) and b).

a) $\int_{\gamma} \frac{e^z}{z} \, dz$

b) $\int_{\gamma} \frac{\sin z}{z^2 + 1} \, dz$

Let $\gamma : z(t) = 2e^{it} + 1, 0 \leq t \leq 2\pi$. Evaluate the integrals in c) and d).

c) $\int_{\gamma} \frac{e^z}{z^2} \, dz$

d) $\int_{\gamma} \frac{\sin z}{(z^2 + 1)^2} \, dz$

2. Evaluate the following contour integrals:

A) $\oint_{c} \frac{\sin(z)}{z^2 - \frac{\pi^2}{4}} \, dz$ on contours a) $|z-1|=2$ and $|z-1|=3$. B) $\oint_{c} \frac{(z+1)^2}{z \cos(z)} \, dz$ on $|z|=1$.

C) $\oint_{c} \frac{e^z}{z-i\pi} \, dz$ on a) $|z-1|=4$ and $|z-1|=3$. D) $\oint_{c} \frac{e^z}{z^3 + 2z} \, dz$ on $|z|=1$.

3. Represent the function $(z^3 - z)^{-1}$ as a Laurent series in the regions given:

a) $0 < |z| < 1$  b) $0 < |z-1| < 1$

4. Find the Laurent series of the function $z/(z^4 + z - 2)$ in the regions given:

a) $|z| < 1$  b) $0 < |z+2| < 3$  c) $|z| > 2$