1. Prove $\int_C \log(z+2)\,dz = 0$, where $C$ is the positively oriented unit circle $|z| = 1$.

2. Let $C_1$ denote the positively oriented boundary of the square whose sides lie along the lines $x = \pm 1$, $y = \pm 1$ and let $C_2$ be the positively oriented circle $|z| = 4$. Prove
   \[ \int_{C_1} \frac{z}{1-e^z}\,dz = \int_{C_2} \frac{z}{1-e^z}\,dz \]

3. Show that if $C$ is a positively oriented simple closed contour, then the area of the region enclosed by $C$ is
   \[ \frac{1}{2i} \oint_C \bar{z}\,dz \]

4. Let $C$ be the circle $|z| = 3$ positively oriented. If the function $g(z)$ ($|z| \neq 3$) is defined to be
   \[ g(z) = \int_C \frac{2s^2-s-2}{s-z}\,ds \]
   Compute $g(2)$ and $g(4)$.

5. Let $C$ be the unit circle $z = e^{i\theta}$, $-\pi \leq \theta \leq \pi$.
   (i). Show that for any real constant $a$, $\int_C \frac{e^{as}}{z}\,dz = 2\pi i$
   (ii). Write the above integral in terms of $\theta$ to prove
   \[ \int_0^\pi e^{a \cos \theta} \cos(a \sin \theta)\,d\theta = \pi \]

6. Let $f$ be an entire function such that $|f(z)| \leq A|z|$ for all $z$, where $A$ is a fixed positive number. Show that $f(z) = az$, where $a$ is a complex constant.