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
$$\frac{1}{2i}\int_C \bar{z}\,dz$$

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, $\int_C \frac{e^{az}}{z}\,dz = 2\pi i$

   (ii). Write the above integral in terms of θ 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.