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Thus we see that

$$\begin{tikzcd} H^1(M,\mathbb{C}) \arrow[r] \arrow[d, equal] & H^1(M,\mathcal{O}) \\ H^1_{DR}(M,\mathbb{C}) & \end{tikzcd}$$

$$\begin{tikzcd} z \arrow[r, mapsto] \arrow[d, bend left] & \bar\partial f \\ df \arrow[ur, bend right] & \end{tikzcd}$$

$\Rightarrow\ df \longmapsto \bar\partial f.$ projection.

끝

It follows that any cocycle $\gamma \in H^1(X,\mathcal{O}^*)$ in the kernel of c_1 is in the image of ι_2^*, i.e., is cohomologous to a cocycle with constant coefficients; thus any line bundle on X with Chern class 0 can be given by constant transition functions.

pf

$$\begin{tikzcd} H^1(X,\mathcal{O}) \arrow[r] & H^1(X,\mathcal{O}^*) \arrow[r, "c_1"] & H^2(X,\mathbb{Z}) \\ H^1(X,\mathbb{C}) \arrow[r] \arrow[u, "\iota_1^*"] & H^1(X,\mathbb{C}^*) \arrow[r] \arrow[u, "\iota_2^*"] & H^2(X,\mathbb{Z}) \arrow[u, equal] \end{tikzcd}$$

$$\begin{tikzcd} a \arrow[r, mapsto] & \gamma \arrow[r, mapsto] & 0 \\ \alpha \arrow[u, "\text{onto}"] \arrow[r, mapsto] & \beta \arrow[u, bend right] & \end{tikzcd}$$

$\Rightarrow\ \exists\ \beta \in H^1(X,\mathbb{C}^*)$ s.t $\iota_2^*(\beta) = \gamma$.
Since β has constant coefficients, γ is cohomologous to $\iota_2^*\beta$ with constant coeffients.
See p133 for $H^1(X,\mathcal{O}^*)$. ....

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