$$p = f - w^*(e - v^*pv)w.$$

The elements pv and $(e-v^*pv)w$ implement the equivalences

$$p \sim v^*pv \quad \text{and} \quad f - p \sim e - v^*pv.$$

Now it follows from Lemma 1 that $f \sim e$.

Von Neumann algebras, W^*-algebras, AW^*-algebras and Baer rings are examples of rings with a complete lattice of projections.

The author wishes to express his appreciation to Bernie Russo whose seminar inspired this paper.

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ON THE FOURIER INVERSION THEOREM FOR R^1

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The following is an elementary "noncomputational" proof of the Fourier inversion theorem for tempered distributions on R^1. The proof does not generalize so easily to R^n, but the inversion theorem for R^n can be deduced from that for R^1.

To get the inversion theorem for tempered distributions it is sufficient, by duality, to have a proof for the space $\mathfrak{D}$ of *test functions* (i.e. functions $\phi \in C^\infty$ such that $\phi^{(m)}(x) = O(|x|^{-N})$ for all m, $N \geqq 0$ as $x \to \pm\infty$). It is also sufficient to consider only the point $x = 0$.

THEOREM. *There exists a universal constant K such that*

(1) $\int_{-\infty}^{\infty} \hat{\phi}(t)dt = K\phi(0)$ *for all* $\phi \in \mathfrak{D}$.

The value of K ($K = 2\pi$) *must be determined, as usual, by substituting some particular function* ϕ. *By linearity,* (1) *is equivalent to the following:*

(2) $\phi(0) = 0$ *implies* $\int_{-\infty}^{\infty} \hat{\phi}(t)dt = 0$.

PROOF OF (2). Since $\phi(0) = 0$, $\psi(x) \equiv (\phi(x)/x) \in C^\infty$. By direct computation, since $\phi(x) = x\psi(x)$, $\hat{\phi}(t) = i(d/dt)\hat{\psi}(t)$. Then, since $\hat{\psi}$ is also a test function (direct verification), $\int_{-\infty}^{\infty} \hat{\phi}(t)dt = i[\hat{\psi}(\infty) - \hat{\psi}(-\infty)] = 0$. Q.E.D.

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Received by the editors October 27, 1966.

[1] This work was partially supported by NSF Grant GP 4033.