· Prove or disprove: Suppose f is convex and X is submartigale, prove that $g(t) = E[f(X_t)]$ is increasing Pf: We ound find a ounter example to disprove it. Let $f(X_t) = \frac{1}{X_t^2}$. Claim $t_1 < t_2$. $f_{t_2} - g_{t_1} = E[f(X_{t_1})] - E[f(X_{t_1})] = E\left[\frac{X_{t_1}^2 - X_{t_2}^2}{X_{t_1}^2 \times X_{t_1}^2}\right] = E\left[\frac{X_{t_1}^2 - X_{t_2}^2 \times X_{t_1}^2}{X_{t_2}^2 \times X_{t_1}^2}\right] = E\left[\frac{X_{t_1}^2 - X_{t_2}^2 \times X_{t_1}^2}{X_{t_1}^2 \times X_{t_1}^2}\right] = E\left[\frac{X_{t_1}^2 - X_{t_1}^2 \times X_{t_1}^2}{X_{t_1}^2 \times X_{t_1}^2}\right]$: X is a submartingale :: E[Xt2] > E[Xt1], tr>t, So E[(X6-X6)(X6+X6)] <0. That is 962-96, <0 So get) is decreasing. · Let the ents to be a martingale, then prove that C(t) = E[ent(St-K)] is increasing. When SELK: Claim to>61, E[e+t2 (St2-K)+ \$ +] = E[ett 65]] =0. Similarly, E[ett(Sh-K)+] =0 When St > K: claim tz > t. E[ett2(St.-K)+ | +] = E[ett2(St.-K) | +] = E[ett2 | St.-K(ett2 + ett2 = e-rt, St, -Ke-rt, +KE[e-rt, -e-rt2] ** = P-16, St. - KETE-16,] · erti <erti : erty

From that	:. e-ti (St,-K) -K. E[e-ti-e-ti] > e-ti (St,-K)
	And then = F=To-the 10 = unt 1+ 77 > = 5 these 27
8	And then $E[E[e^{-tt_2}(S_{\ell_2}-K)^{\dagger}] \neq E[e^{-tt_2}(S_{\ell_1}-K)]$
1	That is E[ett2 (St. +K)+] > E[ett1 (StK)] = E[ett1 (StK)+]
- X1-Y4	So. Cet, is in Geastry
: L K.	THE PROPERTY OF THE PROPERTY O
2	test Tuxias testing testing
	Suppose r=0 and Sis martingale, prove that p(t)= [(Se-K)] is increasing.
	Pf: 0 - Af - Af is last to
	When St Claim t2>t,
L	when $St \geq K$, $p(t_1) - p(t_1) = 0$
	When St LK:
(-\$C) (S	== E[K-542174,] = K-54, = (St,-K)
	Then E[E[K-Stilta]] &> E((St-K)-]
N. S.	Thatis E[K-St.] = E[(StK)-] = E[(StK)-]
	THE THE PARTY OF T
Us CHIZERENT	So pt is increasing.
P	THE LANGUAGE TO BE TO THE TANK
	Wight I sky claim to the state of
Cr. 1	and the state of t