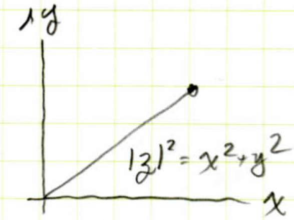
7.11) a) SHOW THAT $|z|^2 = zz^*$ FOR $z = x + iy$

b) PROVE THAT $|zw| = |z| \cdot |w|$

c) SHOW THAT FOR A STANDING WAVE $\Psi(x,t) = \psi(x) e^{-i\omega t}$ THAT $|\Psi(x,t)| = |\psi(x)|$ AND THE PROBABILITY IS INDEP. OF TIME

a) $zz^* = (x+iy)(x-iy) = x^2 - (iy)^2 + ixy - ixy$

$zz^* = x^2 + y^2$ => THIS IS THE MAGNITUDE ON THE COMPLEX PLANE



b) $|zw| = \sqrt{(zw)(z^* w^*)}$

SINCE THESE COMMUTE,

$|zw| = \sqrt{zz^* ww^*} = |z| \cdot |w|$ QED!

c) FOR $\Psi(x,t) = \psi(x) e^{-i\omega t}$

$$|\Psi(x,t)|^2 = |\psi(x)|^2 |e^{-i\omega t}| = |\psi(x)|^2 (e^{-i\omega t})(e^{i\omega t})$$

$$= |\psi(x)|^2 \cancel{\left(\frac{e^{i\omega t}}{e^{i\omega t}}\right)} = 1 \text{ FOR ALL } t$$

$$|\Psi(x,t)|^2 = |\psi(x)|^2 \quad \text{QED!}$$

INDEPENDENT OF TIME!