

P214 Formula Sheet: Prelim I

Complex numbers

$$e^{ix} = \cos(x) + i \sin(x)$$
$$|\underline{A}|^2 = A_r^2 + A_i^2 = \underline{A}^* \underline{A}$$
$$|\underline{A} \cdot \underline{B}| = |\underline{A}| \cdot |\underline{B}|$$
$$|\underline{A}/\underline{B}| = |\underline{A}|/|\underline{B}|$$

Trigonometric Relations

$$\sin(a+b) = \sin(a)\cos(b) + \cos(a)\sin(b)$$
$$\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$$

Basic wave relationships

$$f = 1/T \qquad \omega = 2\pi f$$
$$\omega = 2\pi/T \qquad k = 2\pi/\lambda$$
$$c = \lambda f \qquad c = \omega/k$$

For strings: $c^2 = \tau/\mu$

Wave equation and solutions

$$c^2 \frac{\partial^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2}$$

$$\mp c \frac{\partial y}{\partial x} = \frac{\partial y}{\partial t} \quad (\text{pulse Eq.})$$

$$y(x, t) = f(x - ct) + g(x + ct)$$

$$y(x, t) = h(x + ct) - h(-(x - ct)) \quad \text{reflection from fixed BC}$$

$$y(x, t) = h(x + ct) + h(-(x - ct)) \quad \text{reflection from free BC}$$