2.20 Problem Set 13A **Name: _____**

1. Supplementary Problem Wa13.

2. For a plane progressive wave of height 6 m and length 200 m in deep water,

(a) find the phase velocity, the maximum velocity magnitude of a fluid particle, and the position where this maximum occurs.

(b) How do these change if the fluid depth is 30 m?

3. A sinusoidal wave of wavelength λ and half-amplitude a travels on the surface of a body of water of mean depth h. A pressure-measuring gage is mounted on the bottom. The gage will indicate an average pressure (equal to that at the mean depth) and a fluctuating pressure due to the wave passing by.

(a) Compute the fluctuating part of the pressure on the bottom.

(b) For $\lambda >> h$, show that the variation in the bottom pressure is equal to the change in elevation of the fluid as the wave passes overhead.

4. The boundary condition which makes water wave problems complicated is the [kinematic] [dynamic] boundary condition on the [bottom] [free surface]. When we linearize the water wave problem, we are simplifying the equation for:
[free surface pressure] [free surface kinematics] [both] by ignoring terms that are nonlinear in η and φ.

5. The equation that uniquely relates wave frequency and wavenumber is the _____ relationship. It is derived from the boundary conditions on the _____ .