Quiz 4 Version B

1) What are the amplitude, (natural or angular) frequency, wavelength, and speed of a wave whose displacement is described by:
$y(x,t) = 0.5 \cos(0.25\, x - 4.0\, t + 3.1)$, where x,y are in meters, and t is in seconds.

A) 0.5 m, 4.0 Hz, 0.25 m, 3.1 m/s
B) 0.5 m, 0.64 radians/sec, 0.25 m, 16 m/s
C) 0.5 m, 4.0 radians/sec, 25 m, 16 m/s
D) 0.5 m, 0.64 Hz, 0.25 m, 16 m/s
E) 0.5 m, 25 Hz, 25 m, 16 m/s

2) Water at a pressure of 400 kPa is flowing at speed 3.7 m/s through a pipe, when it encounters an obstruction where the pressure drops by 5%. What fraction of the pipe's area is obstructed?

A) 50% B) 60% C) 70% D) 80% E) 90%

3) A typical mass flow rate for the Mississippi River is 1.8x10^7 kg/s .
What is the flow speed in a region where the river is 1.0 km wide and 4.0m deep?

A) 0.5 m/s B) 1.5 m/s C) 2.5 m/s D) 3.5 m/s E) 4.5 m/s

4) A sound wave with frequency 200Hz is propagating in air at 343 m/sec.
How far apart are the closest two points on the wave that differ in phase by 90 degrees?
A) 3.4 m B) 1.7 m C) 1.3 m D) 0.86 m E) 0.43 m

5) A venturi is constructed of a 8.0 cm diameter pipe with a 2.0 cm diameter throat.
Water pressure in the pipe is twice the atmospheric pressure and it flows with a velocity of 0.50m/s. What is the pressure in the throat?

A) 2.5 atm B) 2.3 atm C) 2.0 atm D) 1.7 atm E) 1.5 atm

6) Consider a very small hole in the bottom of a tank 40.0cm in diameter filled with water to a height of 25 cm. Find the speed at which the water exits the tank through the hole.

A) 2.8 m/s B) 2.4 m/s C) 2.2 m/s D) 1.6 m/s E) 1.2 m/s

7) The water in a garden hose is at an absolute pressure of 1.5atm, and is moving at negligible speed. The hose terminates in a sprinkler system consisting of small holes. What is the maximum height reached by the water from the emerging holes? (density of water = 1000kg/m3)

A) 5m B) 10m C) 15m D) 20m E) 25m

8) A large piston (diameter = 0.1m) moves at a speed of 1cm/sec, pushing fluid into a small tube (diameter = 10mm). What is the fluid velocity in the small tube?

A) 1cm/s B) 10cm/sec C) 1m/sec D) 10m/sec

9) Water enters a house through a pipe with an inside diameter of 2cm at an absolute pressure of 435 kPa. A 1cm diameter pipe leads from the ground floor (where the water enters the house) to the second floor bathroom, 5m above. When the flow speed at the 2cm inlet is 1.5 m/s, find the water pressure in the bathroom. (density of water = 1000kg/m3)

A) 310 kPa B) 330 kPa C) 350 kPa D) 370 kPa E) 390 kPa

10) A heavy cable is hanging vertically, it's bottom end free. How will the speed of transverse waves in the cable compare near the bottom versus near the top of the cable?

A) They will be the same.
B) The speed at the bottom is larger than the speed at the top.
C) The speed at the top is larger than the speed at the bottom.
D) There can't be any waves in the cable because the Tension in the cable is zero.