PROBLEM 1:

The objective is to solve for d, using the following formula

$d^2 = (R + h)^2 - R^2$

$d^2 = \left(3959 + \frac{50}{5280}\right)^2 - (3959)^2$ *note: you must convert h to miles*

$d^2 = \sqrt{15{,}673{,}755.98 \quad - 15{,}673{,}681} = \sqrt{74.98}$

d= 8.66 miles

PROBLEM 2:

If the earth rotates 360 degrees in 24 hours, then it will rotate 15 degrees in 1 hour – 360/24; therefore there are 24 time zones. Time zones were only a convenient way to harmonize railroad schedules in the late 1800s. Up until that, people told time by the sun and used sun dials. This is the method by which we calculate longitude – reverting to the sun.

The solution to the problem about the ship, and the 6 hours of time between 12:00 noon at location and 18:00 at Greenwich is as follows: 6 hours difference between Greenwich and location is also, and since the earth rotates 15 degrees every hour, the 6 x 15 = 90 degreed longitude. And since we have mentioned that we are in the western hemisphere, the answer is 15 degrees west longitude.

PROBLEM 3:

Since we know the distance and the speed, we need to solve for time in the formula D=RT, or T=D/R = 574/15 = 38.27 hrs= 38 hours and 16 minutes, or 1 day 14 hrs and 16 minutes

Since we know the customer wants us there between 1500-1800hrs on Sep 15th, we solve that by:

Sep 15, 15 hours 00 minutes or Sep 14th, 38 hours 60 minutes

Less the time for voyage: 1 day, 38 hours, 16 minutes

Equals: Sep 13th, 0 hours, 44 minutes

So, they must depart on Sep 13th at 44 minutes past midnight, or 3 hours later to arrive by 1800 on Sep 15th