Math 2A Worksheet: 3.9 Related Rates

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1. A cylindrical tank with radius $5m$ is being filled with water at a rate of $3m^3/min$. How fast is the height of the water increasing?

2. If $x^2 + y^2 + z^2 = 9$, $dx/dt = 5$, $dy/dt = 4$, find dz/dt when $(x, y, z) = (2, 2, 1)$.

3. At noon, ship A is 100 km west of ship B. Ship A is sailing south at 35 km/h and ship B is sailing north at 25 km/h. How fast is the distance between the ships changing at 4:00 pm?

4. Water is leaking out of an inverted conical tank at a rate of 10,000 cm^3/min at the same time water is being pumped into the tank at a constant rate. The tank has height 6 m and the diameter at the top is 4 m. If the water level is rising at a rate of 20 cm/min when the height of the water is 2 m, find the rate at which water is being pumped into the tank?