

Math 100 – WORKSHEET 13
RELATED RATES

(1) A particle is moving along the curve $y^2 = x^3 + 2x$. When it passes the point $(1, \sqrt{3})$ we have $\frac{dy}{dt} = 1$. Find $\frac{dx}{dt}$.

(2) (Final, 2015, variant) A conical tank of water is 6m tall and has radius 1m at the top.
(a) The drain is clogged, and is filling up with rainwater at the rate of $5\text{m}^3/\text{min}$. How fast is the water rising when its height is 5m?

(b) The drain is unclogged and water begins to clear at the rate of $\frac{\pi}{4}\text{m}^3/\text{min}$ (but rain is still falling). At what height is the water falling at the rate of $1\text{m}/\text{min}$?

- (3) Two ships are travelling near an island. The first is located 20km due west of it, The second is located 15km due south of it and is moving due south at 7km/h. How fast is the distance between the ships changing if:
- (a) The first ship is moving due north at 5km/h.

- (b) The same setting, but now the first ship is moving toward the island.