Section 3.9: Related Rates

Example: Find $\dfrac{dx}{dt}$ when $y = 3$ and $\dfrac{dy}{dt} = 5$

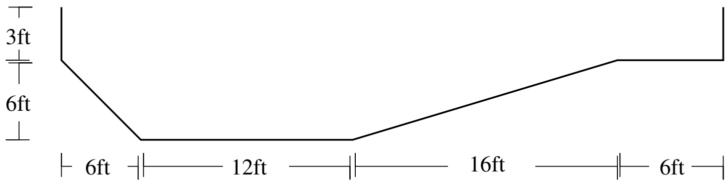
$4x^3 - 5y^2 = -13$

Example: At noon ship A leaves a port traveling North at 35km/hr. Ship B leaves the same port traveling East at 1pm at 25 km/hr. At what rate is the distance between them changing at 3pm?

Example: A person 1.8 meters tall is walking away from a 5meter high lamppost at a rate of 2m/sec. At what rate is the end of the person's shadow moving away from the lamppost when the person in 6 meters from the lamppost?

Example: A water tank has the shape of an inverted right circular cone of altitude 12 ft and base radius of 6ft. If water is being pumped into the tank at a rate of 10 gal/min (approximately 1.337 cubic feet per min) approximate the rate at which the water level is rising when the water is 3 feet deep.

Example: A swimming pool is 20ft wide, 40ft long, 3ft deep at the shallow end and 9 ft deep at its deepest point. See the figure for a cross section. If the pool is being filled at a rate of 180 cubic feet per min, how fast is the water level rising when the depth at the deepest point is 4 ft?



Example: A revolving beacon in a lighthouse makes one revolution every 15 seconds. The beacon is 200ft from the nearest point P on a straight shoreline. Find the rate at which a ray from the light moves along the shore at a point 400 ft from P.

Example: At noon, ship A is 100km north of ship B. Ship A travels west at 35km/hr and ship B is traveling east at 25km/hr. Find how the distance between the ships is changing at 3pm.

Example: Two sides of a triangle have fixed lengths of 3ft and 7ft. The angle between these sides is decreasing at a rate of 0.05 rad/sec. Find the rate at which the area of the triangle is changing when the angle between the fixed sides is 1 radian.