Math 249-L05   Fall 2005

Worksheet 9
[Applications]

1.   Water is withdrawn from a conical reservoir (vertex down). The reservoir is 12 metres in
        diameter and is 15 metres deep. If the water is withdrawn at the constant rate of 7.5 cubic
        metres per minute, how fast is the level of the water falling when the water is 9 metres
        deep?

2.   Water flows in a river which travels from east to west at the rate of 8km./hour. The river
        is 5 km. wide and a canoeist needs to cross the river from the south side of the river to a
        point on the other bank directly north of his starting point. He can row in still water at the
        rate of 6 km/hour. Determine the direction in which he must travel in order to reach the
        required point.

3.   Two sides of a triangle have lengths 12 m. and 15 m. The angle, θ, between them
        increases at the rate of 2° per minute. How fast is the length of the third side changing
        when θ = 60°.

4.   A lighthouse is located on a small island 3 km. Away from the nearest point P on a
        straight shoreline and its light makes four revolutions per minute. How fast is the beam
        of light moving along the shoreline when it is 1 km. From P?

5.   A trough is 10 ft. long and its ends have the shape of isosceles triangles that are 3 ft.
        across the top and have a height of 1 ft. The trough is being filled at the rate of
        12 $ft^3/minute$. How fast is the water level rising when the water is just 0.5 ft. deep.