

Math 101 - Homework 11

Due Friday, November 22

1. Find dy/dx when x and y fit the equation $x \ln(y) + y^3 = \ln(x)$. (3.7 #14)
 - See worked out example on p171.
 - Further practice: 3.7 #13, 15, 17.
 - If you're stuck try: 3.7 # 1, 3, 5.
2. If θ is the angle between a line through the origin and the positive x -axis, the area, in cm^2 , of part of a rose petal is

$$A = \frac{9}{16}(4\theta - \sin(4\theta)).$$

If the angle θ is increasing at a rate of 0.2 radians per minute, at what rate is the area changing when $\theta = \pi/4$? (4.6 #8)

- See Example 3 on p244.
 - Further practice: 4.6 #7, 9, 11.
3. Car A is driving east towards an intersection. Car B has already gone through the same intersection and is heading north. At what rate is the distance between cars changing at the instant when car A is 40 miles from the intersection and traveling at 50 mph and car B is 30 miles from the intersection and traveling at 60 mph. Are the cars getting closer together or farther apart? (4.6 #25)
 - See Example 3 on p244.
 - Further practice: 4.6 #30, 46, 51.
 4. For time, t , in hours, $0 \leq t \leq 1$, a bug is crawling at a velocity, v , in meters/hour given by

$$v = \frac{1}{1+t}.$$

Use $\Delta t = 0.2$ to estimate the distance that the bug crawls during this hour. Find an overestimate and an underestimate. Then average the two to get a new estimate. (5.1 #16)

- Example 3 on p275.
- Further practice: 5.1 #13, 14, 15.