
HOMEWORK DAY 12 – *Implicit Differentiation §2.6*

1. §2.6: 1

2. Find dy/dx , where y is defined implicitly by the following equations

(a) $\sin(x + y) = \cos x + \sin x$

(b) $x^2 + 2xy - y^2 = 6$

(c) $\frac{1}{x} + \frac{1}{y} = 1$

(d) $y \cos(x) = x^2 + 2y^2$

(e) $\tan(x/y) = x$

3. §2.6: 21

4. §2.6: 26 (Find equation for tangent line at the given point)

5. §2.6: 31 (cardioid, compare with figure)

6. §2.6: 32 (compare with figure)

HOMEWORK DAY 13 – *Rates of Change §2.7*

7. §2.7: 5 (position, velocity acceleration)

8. §2.7: 6 (position, velocity acceleration)

9. §2.7: 13a. A company makes computer chips from square wafers of silicon. A process engineer wants to keep the side length of a wafer very close to 15 mm and needs to know how the area $A(x)$ of a wafer changes when the side length x changes. Find $A'(15)$ and explain its meaning in this situation. *Note: Some versions of the e-book may say to “Find x changes.” That is a typo, please ignore it.*

10. §2.2: 37 (percentage of power that is solar)

11. §2.2: 38 (travel vs gas price)

12. §2.1: 52 (price of coffee)

13. §2.7: 22a (gravitational force)

14. If a cylindrical water tank holds 5000 gallons, and the water drains from the bottom of the tank in 40 minutes, then Torricellis' Law gives the volume V of water remaining in the tank after t minutes

$$V = 5000\left(1 - \frac{1}{40}t\right)^2, \quad 0 \leq t \leq 40$$

(a) Sketch a graph of the function.

(b) Find the rate at which water is draining from the tank after t minutes.

(c) When is water draining out fastest? when slowest?

15. §2.7: 30 (violin string)

HOMEWORK DAY 14 – *Related Rates §2.8*

16. §2.8: 2 (circular oil spill)

17. §2.8: 13 (plane)

18. §2.8: 14 (snowball) *Hint: The surface area of a sphere of radius r is $S = 4\pi r^2$.*

19. §2.8: 16 (two ships)