

Math 1496 Calc 1 - Homework #5

Pg. 175, #7, 9, 15, 21, 35 and 37

Pg. 182, #4, 6, 11 and 59

Pg. 182, #17, 31, 33 and 41

Pg. 190, #11, 13, 15, 19 and 21

Pg. 175, #7, 9, 15, 21, 35 and 37

Find the derivative of the following by implicit differentiation. If a point is given, then evaluate the derivative at this point.

$$\#7 \quad x^5 + y^5 = 16$$

$$\#9 \quad x^3 - xy + y^2 = 7$$

$$\#15 \quad xe^y - 10x + 3y = 0$$

$$\#21 \quad y = \sin xy$$

$$\#35 \quad \tan(x + y) = x, (0, 0)$$

$$\#37 \quad 3e^{xy} - x = 0, (3, 0)$$

Pg. 182, #4, 6, 11 and 59

Find the derivative of the inverse $(f^{-1})'(a)$ at the given point for the following

$$\#4 \quad f(x) = x^3 + 3x - 1, a = -5$$

$$\#6 \quad f(x) = \frac{1}{27}(x^5 + 2x^3), a = -11$$

$$\#11 \quad f(x) = x^3 - \frac{4}{x}, x > 0, a = 6$$

Pg. 182, #17, 31, 33 and 41

Find the derivative of the following. Simplify your answer.

$$\#17 \quad y = \arcsin(x - 1)$$

$$\#31 \quad y = x \arccos x - 2\sqrt{x}$$

$$\#33 \quad y = \ln \frac{x+1}{x-1} + \arctan x$$

$$\#41 \quad y = \arctan x + \frac{x}{1+x^2}$$

Pg. 190, #11, 13, 15, 19 and 21

11. The radius r of a circle is increasing at a rate of 4 centimeters per minute. Find the rate of change of the area when $r = 37$ centimeters.

#13. The radius r of a sphere is increasing at a rate of 3 inches per minute.

(a) Find the rates of change of the volume when $r = 9$ inches and $r = 36$ inches.

(b) Explain why the rate of change of the volume of the sphere is not constant even though dr/dt is constant.

#15. All edges of a cube are expanding at a rate of 6 centimeters per second. How fast is the volume changing when each edge is (a) 2 centimeters and (b) 10 centimeters?

19. A swimming pool is 12 meters long, 6 meters wide, 1 meter deep at the shallow end, and 3 meters deep at the deep end (see figure in the book). Water is being pumped into the pool at 14 cubic meter per minute, and there is 1 meter of water at the deep end.

21. Moving Ladder A ladder 25 feet long is leaning against the wall of a house (see figure in book). The base of the ladder is pulled away from the wall at a rate of 2 feet per second.

(a) How fast is the top of the ladder moving down the wall when its base is 7 feet, 15 feet, and 24 feet from the wall?

(b) Consider the triangle formed by the side of the house, the ladder, and the ground. Find the rate at which the area of the triangle is changing when the base of the ladder is 7 feet from the wall.

(c) Find the rate at which the angle between the ladder and the wall of the house is changing when the base of the ladder is 7 feet from the wall.

Due: Friday Oct. 1, 2021