

Instructions: Please use separate pieces of paper for your solutions. Due as a PDF submission to Canvas by 11:59 PM on Tuesday May 19.

(1) (Section 3.10) Evaluate the derivative of the following functions:

(a) $y = \cos(\sin^{-1}(2w))$

(b) $y = 2x \tan^{-1}(x) - \ln(1 + x^2)$

(2) (Section 3.10) Find an equation of the line tangent to the graph of $g(x) = \tan^{-1}(2x)$ at $(1/2, \pi/4)$.

(3) (Section 3.11) An airliner passes over an airport at noon traveling 500 mi/hr due west. At 1:00 P.M., another airliner passes over the same airport at the same elevation heading due north at 550 mi/hr. Assuming both airliners maintain their (equal) elevation, how fast is the distance between them changing at 2:30 P.M.?

(4) (Section 3.11 - Related Rates Problems) A cube starts with an initial edge length of 1 cm. The edges of the cube increase at a rate of 2 cm/s. How fast is the volume changing when the length of each edge reaches 50cm?

(5) (Section 3.11 - Related Rates Problems) A circle has an initial radius of 50 ft when the radius begins to decrease at a rate of 2 ft/min. What is the rate of change of the area at the instant the radius is 10 ft?

(6) (Section 3.11 - Related Rates Problems) An observer is 20 m above the ground floor of a large hotel atrium looking at a glass-enclosed elevator shaft that is 20 m horizontally from the observer (see figure). The angle of elevation of the elevator is the angle that the observer's line of sight makes with the horizontal (it may be positive or negative). Assuming that the elevator rises at a rate of 5 m/s, what is the rate of change of the angle of elevation when the elevator is 10 m above the ground? When the elevator is 40 m above the ground?

