

# Reading Quiz #4

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Student I.D. # \_\_\_\_\_

Read Sections 3.4-3.6(pages 197-220) and work out the following problems.

205.21 Find the derivative of the function  $y = e^{x \cos x}$

205.34 Find the derivative of the function  $y = \sqrt{x + \sqrt{x + \sqrt{x}}}$

206.65 Show that the function  $y = e^{2x}(A \sin 3x + B \cos 3x)$  satisfies the diff. equation  $y'' - 4y' + 13y = 0$ .

208.92 (a) Write  $|x| = \sqrt{x^2}$  and use chain rule to show that  $\frac{d}{dx}|x| = \frac{x}{|x|}$ .

(b) If  $f(x) = |\sin x|$ , find  $f'(x)$  and sketch the graphs of  $f$  and  $f'$ . Where is  $f$  not differentiable?

(c) If  $g(x) = \sin |x|$ , find  $g'(x)$  and sketch the graphs of  $g$  and  $g'$ . Where is  $g$  not differentiable?

214.25 Use implicit differentiation to find an equation of the tangent line to the cardioid at  $(0, \frac{1}{2})$ .

$$x^2 + y^2 = (2x^2 + 2y^2 - x)^2$$

216.55 The Bessel function of order 0,  $y = J(x)$ , satisfies the differential equation  $xy'' + y' + xy = 0$  for all values of  $x$  and its value at 0 is  $J(0) = 1$ .

(a) Find  $J'(0)$ .

(b) Use implicit differentiation to find  $J''(0)$ .

220.24 Find the derivative of the function  $\tan^{-1}(x - \sqrt{1 + x^2})$

220.33 If  $g(x) = x \sin^{-1}(x/4) + \sqrt{16 - x^2}$ , find  $g'(2)$ .