

4. (15 points) (a) Given that $g(x) = f(e^{-x})$, where f is a function with $f'(1) = 3$ and $f''(1) = -5$, compute $g'(0)$ and $g''(0)$.

ANSWERS: $g'(0) = \underline{\hspace{2cm}}$, $g''(0) = \underline{\hspace{2cm}}$

(b) Show that the point $x = 1, y = \pi/4$ lies on the curve

$$2 + xy = \frac{\pi}{4} + x^2 + \tan(y)$$

and calculate dy/dx at this point.

(c) The cost function $C(q)$ represents the cost in dollars of producing q units of some good and the revenue function $R(q)$ represents the revenue in dollars received by selling q units of the good. If $C'(500) = 100$ and $R'(500) = 125$, should the quantity produced be increased or decreased from $q = 500$ in order to increase profits? Explain the reason for your answer.