

## Math 124 Quiz #5 Solutions

1. (a) Using the product rule:  $h'(t) = \frac{d}{dt}[e^t] \cdot (4t^2 + 7t) + e^t \cdot \frac{d}{dt}[4t^2 + 7t]$

$$= e^t(4t^2 + 7t) + e^t(8t + 7)$$

(b) Using the quotient rule on the first term (and the product rule to take the derivative of the function of the numerator):

$$F'(x) = \frac{(x^2-7) \frac{d}{dx}[3x \cdot e^x] - 3xe^x \frac{d}{dx}[x^2-7]}{(x^2-7)^2} + 18x$$
$$= \frac{(x^2-7)(3 \cdot e^x + 3x \cdot e^x) - 3xe^x(2x)}{(x^2-7)^2} + 18x$$

2. Note:  $g'(x) = 3 \cos x \Rightarrow$  Slope at  $x = 0$ :  $g'(0) = 3 \cos 0 = 3$

Equation of tangent:  $y = 3x + 2$

3. We are looking for  $x$ -values at which the slope of  $y = 3e^x - 6x$  is equal to 0.

Since the slope at any given  $x$ -value is given by  $\frac{dy}{dx} = 3e^x - 6$ .

$$\begin{aligned} \text{So we need to solve } 3e^x - 6 = 0 &\Rightarrow 3e^x = 6 \\ &\Rightarrow e^x = 2 \quad \Rightarrow x = \ln(2) \end{aligned}$$