PRACTICE III

1. What is the value of:

$$\lim_{x \to 16} \frac{x - \sqrt{x} - 12}{\sqrt{x} - 4}$$

2. Some values of two functions and their derivatives are shown in the table below:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	11	5
2	1	3	2	7
3	2	1	3	13

(a) What is the value of $(f \circ g)'(1)$

3. Use the squeeze theorem to prove that:

$$\lim_{x \to \infty} \frac{1}{x + e^{-x}} = 0$$

4. Consider the function $g(x) = \sqrt{x}$

   (a) Find the local linearization $L_1(x)$ of $g(x)$ at $x = 1$ and use it to estimate the value of $\sqrt{1.2}$

5. Consider the function

$$f(x) = \frac{x^3}{6} + x - x \ln |x|, \qquad x \neq 0$$

(a) Which of the following correctly describes where the function is concave upward?

6. Derive the differentiation formula for the inverse sine function, i.e. show how we obtain the formula

$$\frac{d}{dx}\arcsin(x) = \frac{1}{\sqrt{1-x^2}}$$