MA1125 – Calculus
Tutorial problems #2

1. Determine the inverse function f^{-1} in each of the following cases.

$$f(x) = \log_3(2x-5) - 1, \qquad f(x) = \frac{2\cdot 5^x + 7}{3\cdot 5^x - 4}.$$

2. Simplify each of the following expressions.

$$\sec\left(\tan^{-1} x\right), \qquad \cos\left(\sin^{-1} x\right), \qquad \log_2 18 - 2\log_2 3.$$

3. Use the ε-δ definition of limits to compute $\lim_{x\to 3} f(x)$ in the case that

$$f(x) = \left\{ \begin{array}{ll} 3x-7 & \text{if } x \le 3 \\ 8-2x & \text{if } x > 3 \end{array} \right\}.$$

4. Compute each of the following limits.

$$L = \lim_{x\to 2} \frac{x^3 - 2x^2 + 5x - 1}{x-3}, \qquad M = \lim_{x\to 2} \frac{x^3 - 3x^2 + 4x - 4}{x-2}.$$

5. Use the ε-δ definition of limits to compute $\lim_{x\to 3}(3x^2 - 7x + 2)$.

6. For which value of a does the limit $\lim_{x\to 2} f(x)$ exist? Explain.

$$f(x) = \left\{ \begin{array}{ll} 2x^2 - ax + 3 & \text{if } x \le 2 \\ 4x^3 + 3x - a & \text{if } x > 2 \end{array} \right\}.$$

7. Determine the inverse function f^{-1} in the case that $f\colon [2,\infty) \to [1,\infty)$ is defined by

$$f(x) = 2x^2 - 8x + 9.$$

8. Compute each of the following limits.

$$L = \lim_{x\to 3} \frac{x^3 - 5x^2 + 7x - 3}{x-3}, \qquad M = \lim_{x\to 3} \frac{2x^3 - 9x^2 + 27}{(x-3)^2}.$$

9. Use the ε-δ definition of limits to compute $\lim_{x\to 2} \frac{1}{x}$.

10. Use the ε-δ definition of limits to compute $\lim_{x\to 2}(4x^2 - 5x + 1)$.