Directions: show all your work and simplify your answers

1. **Differentiate the following functions using derivative rules:**

   a) f(x) = π^{100}

   b) f(t) = $2.5t^6 - 1.4t^5 + 2t^2 + 3$

   c) f(x) = $x^6 + x^3 cos(x)$

   d) y = $3x - csc(x) + 4sin(x)$

   e) f(x) = $\frac{sin(x)}{1+cos(x)}$

2. **Prove that $\frac{d}{dx}$ cot(x) = $-csc^2(x)$ Hint:** remember that $cot(x) = \frac{1}{tan(x)}$