*Questions*

1. Let $f(x) = \sqrt{x}$. Graph each of the following:

   - $f(x-2)+1$
   - $f(x/2)-1$
   - $f(-2x)$
   - $-f(-x)$

2. Prove that $g(x) = \frac{1}{x-x^3}$ is an odd function.

3. Prove that $g(x) = x^3 \sin(x)$ is an even function.

4. Prove the following:

   - The product of two even functions is even.
   - The product of two odd functions is even.
   - The product of an even function and an odd function is odd.

5. Find a global inverse to each of the following functions:

   - $f(x) = 1 + x^3$
   - $f(x) = e^{5x+2}$
   - $f(x) = (x-2)^5 + 14$
   - $f(x) = \frac{1+2x}{7+x}$
   - $f(x) = \sqrt[5]{x^3 - 2}$
   - $f(x) = \ln(\ln(x+2))$

6. If $f(x) = (x+1)^3$ graph $f^{-1}$.

7. Say whether each of the following functions is invertible. If it is, give an inverse. If it isn't, restrict its domain to make it invertible and give an inverse of the restricted function. E.g. $f : \mathbb{R} \to \mathbb{R}$ given by $f(x) = x^2$ is not invertible, but $f : [0, \infty) \to \mathbb{R}$ given by $f(x) = x^2$ is invertible and has inverse $f^{-1} : \mathrm{Ran}[f] = [0, \infty) \to [0, \infty)$ given by $f^{-1}(x) = \sqrt{x}$.

   - $f(x) = (x-2)^2 + 1$
   - $f(x) = \frac{1}{x^2-2}$
   - $f(x) = 10(\sqrt{x}+1)^5$
   - $f(x) = (x-4)^4$
   - $f(x) = e^{-(x-1)^2}$

8. Graph the function $\log_2(x)$ on the same plot as $2^x$

9. Express each of the following using only natural logs and without any powers or products inside of logarithms

   - $\log_2(3)$
   - $\log_4(4x^y)$
   - $\log_8(4)/\log_8(e)$

10. Suppose a radioactive material decays as $A(t) = A_0 .98^{t/20}$. What is its half life?