Homework 2 (with answers)

1. Evaluate and simplify the following expressions:
   - $10^5 10^{-3}$
   - $\log_{10} 1000$
   - $\log_2 32$
   - $25^{3/2}$

2. Label each of these as either rational or irrational:
   - 67.2715882509
   - e
   - $sqrt2$
   - π
   - 25/2
   - 2/3
   - 1577

3. Evaluate this expression:

   $$\lim_{x \to 15} \left(\frac{3}{(x-15)^2} + 5 \right)$$

4. Evaluate this expression:

   $$\lim_{x \to \infty} \left(\frac{3}{(x-15)^2} + 5 \right)$$

5. Calculate the slope of this function at $x = 3$

   $$f(x) = 2x^3 + 1$$

6. Perform gradient descent on this function to find its minimum.

   $$f(x) = 5x^2 + 1$$

Calculate the derivative.

7. Calculate the under this function from $x = -3$ through $x = 5$.

   $$f(x) = 5x^2 + 1$$