1. [5 pts] The United States paid about 4 cents an acre for the Louisiana Purchase in 1803. Suppose the value of this property grew at an annual rate of 5.5% compounded annually. What would an acre be worth today?

**Solution:** Using the formula for compound interest, we have

\[
0.04(1 + \frac{0.055}{1})^{(2001-1803)} = 1607.115164
\]

or about $1607.12 an acre. This is fairly reasonable by today's prices ...

2. [5 pts] The original purchase price was $15,000,000.00. At the same rate of inflation, what would that be in today’s (2001) dollars?

**Solution:** Using the same formula, we have

\[
15,000,000(1 + \frac{0.055}{1})^{(2001-1803)} = 6.026681863 \times 10^{11}
\]

or $602,668,186,300.00 (over 602 Billion). This is a significant portion of the U.S. gross national product (or national debt!)

3. [5 pts] Given the functions \( f(x) = 2x + 3 \) and \( g(x) = \sqrt{x} \) find \((f \circ g)(x)\) and \((g \circ f)(x)\) and the domains of each.

**Solution:** \( f(g(x)) = 2\sqrt{x} + 3 \), with domain \( x \geq 0 \). \( g(f(x)) = \sqrt{2x + 3} \), with domain 
\[
2x + 3 \geq 0 \text{ or } x \geq -\frac{3}{2}
\]

Note, not only are \((f \circ g)(x)\) and \((g \circ f)(x)\) different functions, their domains are different also.