1. Find the definite integrals using the fundamental theorem of calculus. You may need to use a substitution.
   a. $\int_0^x e^t dt$
   b. $\int_0^x (t+3)^2 dt$
   c. $\int_0^x \sqrt{t+9} dt$
   d. $\int_0^x \frac{3}{(4t+5)} dt$
   e. $\int_0^x 6e^{3t-2} dt$
   f. $\int_0^x 3t^2 e^{t^3+2} dt$
2. Consider the function $F(x) = \int_{-2}^x \frac{1}{1+t^2} dt$.
   Determine the intervals on which $F(x)$ is increasing.
3. Find the average value of $g(x) = e^{2x}$ on the interval $[1,4]$.
4. A rock is dropped from a cliff. The velocity of the rock, measured in feet per second, after t seconds, is $v(t) = -32t$. The rock hits the ground 10 seconds later. How high is the cliff?