1. Find constants $A$, $B$, and $C$ such that the function $y = Ax^2 + Bx + C$ satisfies the differential equation $y'' + y' - 2y = x^2$.

2. §3.7, p.180, #10: If a ball is thrown vertically upward at 80 ft/s, then the height after $t$ seconds is given by $h(t) = 80t - 16t^2$.
   (a) What is the maximum height reached by the ball?
   (b) What is the velocity of the ball when it is 96 ft above the ground on the way up and on the way down?

3. §3.8, p.187, #16: A spotlight on the ground shines on a wall 12 m away. If a man 2 m tall walks from the spotlight toward the building at a speed of 1.6 m/s, how fast is the length of the shadow on the building decreasing when he is 4 m from the building?

4. §3.8, p.187, #24: A trough is 10 ft long and its ends have the shape of isosceles triangles that are 3 ft across at the top and have a height of 1 ft. If the trough is being filled with water at a rate of 12 ft$^3$/min, how fast is the water level rising when the water is 6 inches deep?

5. §3.9, p.193, #6: Find the linear approximation of the function $g(x) = \sqrt[3]{1 + x}$ at $a = 0$ and use it to approximate the numbers $\sqrt[3]{0.95}$ and $\sqrt[3]{1.1}$. Illustrate by graphing $g$ and the tangent line.