

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 $12 \text{ ft}^3/\text{min}$, 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.