Section 4.8 ***Newton's Method***

Ex: Starting with $x_1 = 2$, find the third approximation x_3 to the root of the equation $x^3 - 2x - 5 = 0$.

Ex: Use Newton's method to find $\sqrt[6]{2}$ correct to eight decimal places.

Ex: Find, correct to six decimal places, the root of the equation $\cos x = x$.

Section 4.9 ***Antiderivatives***

Def: A function F is called an anti-derivative of f on an interval I if $F'(x) = f(x)$ for all x in I.

Theorem: If F is an antiderivative of f on an interval I, then the most general antiderivative of on I is $F(x) + C$ where C is an arbitrary constant.

Power Rule: $f(x) = x^n \Rightarrow F(x) = \frac{x^{n+1}}{n+1} + C; n \neq -1$

Ex: Find the antiderivative of the following functions.

a) $y = x^7$

b) $y = \frac{2}{3}\sqrt[3]{x^7}$

Formulas for anti-derivatives:

Properties of Antiderivatives:

Ex: Find the antiderivative of the following.

a) $f(x)=\cos x-\dfrac{3\sqrt[5]{x}-\sqrt[3]{x}}{x}+2\left(\sqrt{x}+3\right)^2$

b) $f(x)=\sec^2 x-\dfrac{3}{1+x^2}-4e^x+\dfrac{5}{\sqrt{1-x^2}}+3$

Ex: Find a function $f\left(x\right)$ with the following conditions:

a) $f'(x)=x\sqrt[5]{x^3}+x-1; f(1)=2$

b) $y = \sec^2(x) - \dfrac{1}{1+x^2} - 3x + 2; \quad f(0) = 4$

c) $f''(x) = 12x^2 + 6x - 4; f(0) = 4, \text{and } f(1) = 1$

Ex: A stone is dropped from the upper observation deck 450 m above the ground.

a) Find the distance of the stone above ground level at time t.

b) How long does it take the stone to reach the ground?

c) With what velocity does it strike the ground?

d) If the stone is thrown downward with a speed of 5 m/s, how long does it take to reach the ground?

Ex: A car braked with a constant deceleration of 16 ft/s^2, producing skid marks measuring 200 ft before coming to a stop. How fast was the car traveling when the brakes were first applied?

Ex: A car is traveling at 50 mph when the brakes are fully applied, producing a constant deceleration of 40 ft/sec^2. What is the distance covered before the car comes to a stop?