ADDITIONAL EXERCISES

You do not have to submit this!

Questions:

(1) Find the linear approximation of $\sqrt[3]{x}$ near $x = 1000$.
Use it to estimate $\sqrt[3]{910}$.
Use concavity to determine whether this is an overestimation or an under estimation.
Use Taylor's Theorem to show that the error of your approximation in absolute value is less than 0.02.

(2) Find the linear approximation of $x^{1.2}$ near $x = 1$.
Use it to estimate $1.2^{1.2}$.
Use concavity to determine whether this is an overestimation or an under estimation.
Use Taylor's Theorem to show that the error of your approximation in absolute value is less than 0.005.

(3) Find the 3rd Taylor polynomial of $(x + 1)e^x$ near $x = 0$.
Use it to estimate $1.5\sqrt{e}$.

(4) "Estimating π": Recall that $\arcsin(0.5) = \frac{\pi}{6}$ and $\arcsin(1) = \frac{\pi}{2}$.
Find the 3rd degree approximation of $\arcsin x$ near $x = 0$ and use it to estimate $\arcsin(0.5)$ and $\arcsin(1)$.
Use these estimations to estimate π. Are these good estimations of π?

(5) Differentiate the following functions:
   (a) $\arctan(\sqrt{x})$
   (b) $\sqrt{x}\arccos x$

(6) Do the following for $f(x) = \frac{1}{2x} + \arctan x$:
   - Find increasing and decreasing intervals.
   - Find local extremes.
   - Find vertical and horizontal asymptotes.
   - Draw a graph of the function, indicating all previous information.

(7) Let ABC be a triangle such that $AB = 6_{\text{cm}}$ and $AC = 5_{\text{cm}}$. The edge BC is increased at a rate of $1_{\text{cm/sec}}$. Find the rate of change of the angle $\angle A$ (in radians/second) when $BC = 5_{\text{cm}}$.