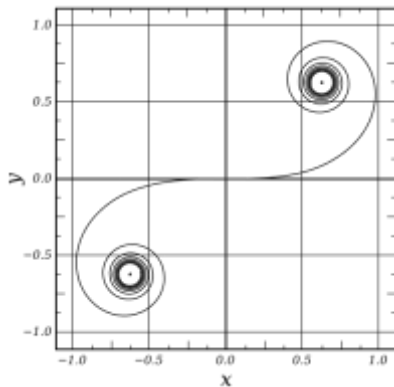
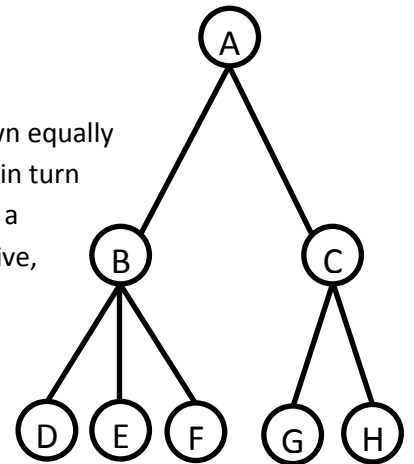


Problems of the Month

December 2016 & January 2017

General Problem:

When a person passes away, they often have some inheritance that is passed down equally between their children. If their children are not alive, each child's inheritance will in turn pass to their children (the grandchildren of the original person). Suppose we have a family tree as illustrated to the right. If A has \$120,000 and neither B nor C are alive, how much money do each of $D, E, F, G,$ and H receive?



Calculus Problem:

The summation below converges for all real values of x . Find its derivative and express it in closed form.

$$\sum_{n=0}^{\infty} (-1)^n \frac{x^{4n+3}}{(2n+1)!(4n+3)}$$

Challenge Problem:

Suppose $X, Y,$ and Z are three different circles of equal radius which are mutually tangent. Let circle A be the circle tangent to $X, Y,$ and Z inside the gap between them, and let circle B be the circle tangent to $X, Y,$ and Z that surrounds them. Find the ratio of the radius of B to the radius of A in the form $a + b\sqrt{c}$ where $a, b,$ and c are integers.