Math Primer Exercises 2:
I N F I N I T E
S E R I E S

[easy]   a) Approximate $y = \sin(2)$ by using only 4 terms.

b) Approximate $y = \sin(90°)$ by using only 4 terms.

[medium] a) Write out an approximation series for $y = \sin(2x)$ and approximate to 2 terms.

b) Write and simplify $2\sin(x)\cos(x)$ to 2 terms by using only a 2-term approximation of $\sin(x)$ and $\cos(x)$. What did you notice between question a) and b)?

[hard]   a) Find the McLauren series, $P(x)$, for $\cos(x)$, where $P(x)$ is determined by:

$$P(x) = f(0) + f'(0)x + \frac{f''(0)}{2!}x^2 + \frac{f'''(0)}{3!}x^3 + \cdots$$

Here f is the function we wish to find the McLauren series of; in this case $f = \cos(x)$, and the primes (') on the f indicate the number of derivatives to take of that function. For example f'' would indicate to take the 2nd derivative of the function $\cos(x)$. You are also given that the derivative of $\cos(x)$ is $-\sin(x)$ and the derivative of $\sin(x)$ is $\cos(x)$.

b) For those who know a little bit more calculus, can you prove that $\frac{d}{dx}(e^x) = e^x$ by doing the derivative of the McLauren expansion of e^x ?