CREATE A NEW SERIES FROM AN OLD SERIES

1. Find the Taylor series for $g(x) = x^2 e^x$ about $x = 0$. Include the general term.

2. Find the Taylor series for $h(x) = \ln(4+8x)$ about $x = 0$. Include the interval of convergence.

USE A SERIES TO EVALUATE OR APPROXIMATE.

3. Find the exact value of $1+2+\frac{4}{2!}+\frac{8}{3!}+\frac{16}{4!}+\cdots$.

4. Solve for x: $x-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\cdots=1$

5. Find $f^{(5)}(0)$ and $f^{(6)}(0)$ for $f(x) = \arctan(x)$.

6. Evaluate the limit $\lim\limits_{x\to\infty}\frac{x\cdot\arctan(x)}{e^{x^2}-1}$.

7. Estimate $\int_0^1 e^{-x^2}\,dx$.

EXPAND A FUNCTION IN A SERIES

8. Expand $F = \frac{mgR^2}{(R+h)^2}$ in terms of $\frac{h}{R}$. Assume R is very large when compared to h.

9. Expand $Q = 2\pi\sigma\left(\sqrt{R^2 + a^2} - R\right)$ in terms of $\frac{a}{R}$. Assume R is very large when compared to a.

COMPLEX NUMBERS

10. Find a formula for e^{it} where $i = \sqrt{-1}$ and use it to find $e^{\pi i}$ and $(1+i)^{20}$.

11. Express $\frac{1}{2} + \frac{\sqrt{3}}{2}i$ in the form $Re^{i\theta}$ and $e^{(3+4i)t}$ in the form $a + bi$.