Let $P(x)$ be the power series

$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k}}{(2k)!}$$

1. Find the interval of convergence of $P(x)$.
2. Find $S_1(x)$, $S_2(x)$, $S_3(x)$, $S_4(x)$
3. Graph $S_1(x)$, $S_2(x)$, $S_3(x)$, and $S_4(x)$ on the same set of axes for $-2\pi \leq x \leq 2\pi$ and $-5 \leq y \leq 5$.

   Now plot $S_7(x)$ over the same range.
4. What familiar function do you think $P(x)$ is?