Calculus 1B - Answers to SSS exercises, week 3

1. 1.1
   - ▷ interval of convergence: $-6 < x < -4$
   - ▷ radius of convergence: 1
   - ▷ sum: $-\dfrac{1}{x+4}$

   1.2
   - ▷ interval of convergence: $-\frac{1}{2} < x < \frac{1}{2}$
   - ▷ radius of convergence: $\frac{1}{2}$
   - ▷ sum: $\dfrac{1}{1-2x}$

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2. $\cos 2x = 1 - \dfrac{(2x)^2}{2!} + \dfrac{(2x)^4}{4!} - \dfrac{(2x)^6}{6!} + \ldots$

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

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3. 3.1 $P_0(x) = \frac{1}{2}$

   3.2 $P_1(x) = \frac{1}{2} - \frac{1}{4}x$

   3.3 $P_2(x) = \frac{1}{2} - \frac{1}{4}x + \frac{1}{8}x^2$

   3.4 $P_3(x) = \frac{1}{2} - \frac{1}{4}x + \frac{1}{8}x^2 - \frac{1}{16}x^3$

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4. $\sinh x = \dfrac{e^x - e^{-x}}{2} = \dfrac{x}{1!} + \dfrac{x^3}{3!} + \dfrac{x^5}{5!} + \dfrac{x^7}{7!} + \dots$

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

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5. 5.1 e^{x^4}

   5.2 $\sin(\frac{1}{5})$

   5.3 $e^{-\frac{1}{5}}$