Unit 4 Practice : Partial Solutions

1. a. conv., sum is $15/4$
   b. conv., sum is -3
   } geom. series
   c. div
   d. conv., sum is e
   e. conv., sum is e^2
   } Ratio Test & Taylor series

2. a. seq. div.
   b. series, div.
   c. seq., conv. to 0
   d. series, div. (p-series w/ $p = \frac{1}{2}$)
   e. seq, conv to $1/2$
   f. series, div. (Thm 9.2, "Test for Divergence")
   g. seq., conv to 0
   h. series, div. by Integral Test (show $\int_1^\infty \frac{2x+1}{x^2+x}\,dx$ div.)

3. a. center: $x = 0$, rad. of cvgce: 5
   b. center: $x = -2$, rad. of cvgce: 4
   c. center: $x = 2$, rad. of cvgce: ∞

4. a. $1 - \frac{1}{2}(x-\pi/2)^2 + \frac{1}{24}(x-\pi/2)^4$
   b. $(x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 - \frac{1}{4}(x-1)^4$
   c. $\frac{1}{3} - \frac{1}{9}(x-1) + \frac{1}{27}(x-1)^2 - \frac{1}{81}(x-1)^3 + \frac{1}{243}(x-1)^4$

5. a. (i) $\frac{\sin x}{x} = 1 - \frac{x^2}{6} + \frac{x^4}{120} - \ldots$ for all x
   (ii) $\cos(x^2) = 1 - \frac{x^4}{2} + \frac{x^8}{24} - \ldots$ for all x
   (iii) $\sinh x = x + \frac{1}{6}x^3 + \frac{1}{120}x^5 + \ldots$ for all x
   (iv) $\frac{e^x - 1}{x} = 1 + \frac{1}{2}x + \frac{1}{6}x^2 + \frac{1}{24}x^3 + \frac{1}{120}x^4 + \ldots$ for all x
   b. (i) 1
   (ii) 1
   c. $Si(t) = t - \frac{1}{18}t^3 + \frac{1}{600}t^5 - \ldots$ for all x
   d. $1 - \frac{1}{10} + \frac{1}{216} = 977/1080$