1. (a) ANSWER: $T_2(x) = 2 + 4(x-1) + 3(x-1)^2$

   (b) HINT: Taylor's inequality states that the error is bounded by $\dfrac{M}{3!}|x-1|^3$, where M is an upper bound of $f'''(x)$ on the interval J. But $f'''(x) = 6$ for all values of x. So, we can take M to be 6 and we need an interval J on which $|x-1|^3 < 0.001$.
   ANSWER: $J = [0.9, 1.1]$

2. HINT: The Taylor series for $\dfrac{e^{x^2}-1}{x}$ is

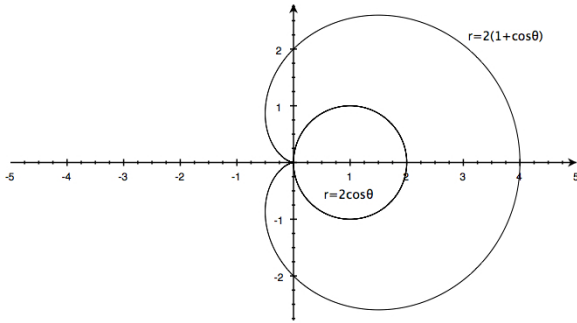$$x + \frac{x^3}{2!} + \frac{x^5}{3!} + \frac{x^7}{4!} + \dots$$

Further, since $\dfrac{3}{(x-1)^2} = 3\dfrac{d}{dx}\left(\dfrac{1}{1-x}\right)$, the Taylor series for $\dfrac{3}{(x-1)^2}$ is

$$3 + 6x + 9x^2 + 12x^3 \dots$$

ANSWER: The Taylor series for $f(x)$ is

$$3 + 7x + 9x^2 + 12.5x^3 + \dots$$

3. (a) F; (b) T; (c) F; (d) T; (e) F; (f) T; (g) T; (h) F

4. (a) ANSWER: $x = -1$, $y = t$, $z = 3 + t$
   (b) ANSWER: $5x - 2y + 2z = 1$

5. ANSWER: 1

6. (a) ANSWER: $t = \sqrt[6]{\dfrac{1}{2}}$
   (b) ANSWER: $a_T = 0$

7. (a) ANSWER: $y = \dfrac{3}{7}(x-2) + 2$
   (b) ANSWER: The curve has a horizontal tangent at $t = -\frac{1}{2}$ and vertical tangents at $t = 0$ and $t = -\frac{3}{4}$.

8. (a) ANSWER: The domain of f is the set of points (x,y) such that $y < 2x$ but $y \neq 2x - 1$.
   (b) ANSWER: $z = -2e(x-e) + 5e(y-e) + 3e^2$
   (c) ANSWER: $f(3,3) \approx 9e$

9. ANSWER: The base of the glass side is 8.0505 meters and the height of the glass side is 4.0252 meters. The length of the pool is 30.85989 meters.

10. (a) ANSWER: The region R is the region between these two curves:

r=2(1+cosθ)

r=2cosθ

(b) ANSWER: 5π