HW 2 Problem 5: The easy way

5) $(1+x+y^2)^{1/2} = 1 + \frac{1}{2}(x+y^2) + \frac{1/2(1/2-1)}{2!}(x+y^2)^2 + \frac{1/2(1/2-1)(1/2-2)}{3!}(x+y^2)^3 + 4^{th}$ order terms

for $(x+y^2) \ll 1$
so use binomial expansion
(Expanding around (0,0))

$$= 1 + x/2 + y^2/2 - \frac{1}{8}\left(x^2 + 2xy^2 + 4^{th}\text{ order}\right) + \frac{1}{16}\left(x^3 + 4^{th}\text{ order or higher}\right)$$

$$= \boxed{1 + x/2 + y^2/2 - x^2/8 - xy^2/4 + x^3/16}$$