Reformulation to improve precision

1) Reformulate the following functions to avoid loss of significance:

a. $\dfrac{1-\cos\epsilon}{\epsilon^2}$ for small ϵ

b. $\dfrac{y(e^{(a+b)y}-1)}{(e^{ay}-1)(e^{by}-1)}$ for small y

c. $\dfrac{\sin x}{x-\sqrt{x^2-1}}$

d. Identify where the loss of significance occurs in (c) above

2) Reformulate the following terms using the Mean Value Theorem to avoid loss of significance:

a. $\sqrt{82}-\sqrt{81}$

b. $\sin(x+\epsilon)-\sin x$ for small ϵ and large x