Answers to Problems I.

1. a) 5 ; b) 8.333.. ; c) 9.0909... ; d) 9.8039... e) 9.90099...

   Guess $A_f \to 10$. $\frac{1}{\beta} = 10.0$.

2. a) 4.99 ; b) 2.498.. ; c) 1.249... d) 0.9996...
    (5.0)   (2.5)   (1.25)   (1.0)

3. $x_{in} = \frac{1}{101}$; decreased. $x_{in} \to 0$

4. $\frac{x_0'}{x_0} = -\beta A_{oe}$; $\frac{x_{in}'}{x_{in}} = -A_{oe}\beta$;

5. Initial gain 20.818 ; Final gain = 20.832

   $\frac{\Delta A_f}{A_f} = 6.725 \times 10^{-4}$.   From notes $\frac{\Delta A_f}{A_f} \approx \frac{1}{1+2400 \times \frac{1}{21}} \times \frac{200}{2400} = 7.23 \times 10^{-6}$

   ↑ more accurate than
                calculus version! →

6. FGE $= \frac{1}{A_{oe}\beta} = 0.875\%$.

7. $9.744 < A_f < 10.139$ ie $A_f = 9.9415 \pm 0.1975$. NB this error in

   $\frac{\pm 0.1975}{9.9415} \times 100 = \pm 1.99\%$ cf error in β which is $\frac{\pm 0.002}{0.100} \times 100 = \pm 2.0\%$!

8. Answers given.

Answers to Problems II

① 10; 9.375

②. Given in Question

③ $\frac{R_F + R_E}{R_E}$.