MODELLING PROBLEMS #2

Consider the "arrested topographic wave" problem:

$$\zeta_y + \frac{r}{fs}\zeta_{xx} = 0$$

$$\zeta_x = \frac{Ff}{rg} \quad \text{at } x = 0$$

$$\zeta = 0 \quad \text{at } x \to \infty$$

where $r = 0.1$ cm/sec, $s = 0.001$, $f = 10^{-4}$ sec.

Solve two problems:

a) $F = 0$, $\zeta = \begin{cases} 10 \text{ cm} & 0 \le x \le 50 \text{ km} \\ 0 & x \ge 50 \text{ km} \end{cases}$;

b) $F = -1$ cm^2/sec^2, $\zeta(x,0) = 0$

Solve numerically for ζ at -500 km $< y < 0$ in each problem using both the forward time/centered space scheme and the fully implicit scheme.