a) $\Pr[resp_i=0 \mid male_i=1, active_i=1, age_i=50] \approx \dfrac{1}{1+\exp(-2.49+0.95+0.91+0.07\times 50-0.07\times(\frac{50}{10})^2}$

≈ 0.25

$\text{elasticity} = \Pr[resp_i=0 \mid male_i=1, active_i=1, age_i=50] \cdot active_i \beta_2$

$\approx 0.25 \times 1 \times 0.91 \approx 0.22$

$\text{elasticity} = \Pr[resp_i=0 \mid male_i=1, active=0, age_i=50] \cdot active_i \cdot \beta_2$

$=0$

b) $\exp(\beta_2 active_i)\exp(\beta_0+\beta_1 male_i+\beta_3 age_i+\beta_4 (age_i/10)^2) = \exp(\beta_2 active_i) z_i$

$$\frac{\Pr[resp_i=1 \mid active_i=1]-\Pr[resp_i=1 \mid active_i=0]}{\Pr[resp_i=1 \mid active_i=0]} = \frac{\dfrac{\exp(\beta_2)z_i}{1+\exp(\beta_1)z_i}-\dfrac{z_i}{1+z_i}}{\dfrac{z_i}{1+z_i}} \begin{matrix}\times \dfrac{(1+z_i)}{z_i} \\ \times \dfrac{(1+z_i)}{z_i}\end{matrix}$$

$$\frac{\exp(\beta_2)(1+z_i)}{1+\exp(\beta_1)z_i}-1 = \frac{\exp(\beta_2)(1+z_i)-(1+\exp(\beta_1)z_i)}{1+\exp(\beta_2)z_i}$$

$$= \frac{\exp(\beta_2)-1}{1+\exp(\beta_1)z_i}$$

$$= (\exp(\beta_2)-1)\times\frac{1}{1+\exp(\beta_1)z_i}$$

$$= (\exp(\beta_2)-1)\times \Pr[resp_i=0 \mid active_i=1]$$

c) $\frac{Pr[resp_i = 1 \mid active_i = 1] - Pr[resp_i = 1 \mid active_i = 0]}{Pr[resp_i = 1 \mid active_i = 0]} = (\exp(\beta_2) - 1)\, Pr[resp_i = 0 \mid active_i]$

$(\exp(\beta_2) - 1)\, Pr[resp_i = 0 \mid active_i = 1, age_i = 50, male_i = 1] =$

$(\exp(0.91) - 1) \dfrac{1}{1 + \exp(-2.49 + 0.95 + 0.91 + 0.07 \times 50 - 0.07 \times \left(\frac{50}{10}\right)^2}$

$\approx 1.48 \times 0.24 \approx 0.35$