Q1

Exercise 8 a, c on page 624.

a)

$\text{E}(Y|x^* = 2000) = 1800 + 1.3 \cdot (2000) = 4400$

$\text{P}(Y > 5000) = \text{P}\left(Z > \frac{5000 - \text{E}(Y|x^*=2000)}{\sigma/\sqrt{(n)}}\right) = \text{P}\left(Z > \frac{5000-4400}{350}\right) = \text{P}(Z > 1.71)$

$1 - \Phi 1.71 = 1 - 0.958 = \mathbf{0.0432}$

c)

$\text{E}(Y_1) = \text{E}(Y|x^* = 2000) = 4400$

$\text{E}(Y_2) = \text{E}(Y|x^* = 2500) = 1800 + 1.3 \cdot (2500) = 5050$

$\text{E}(Y_2 - Y_1) = 5050 - 4400 = 650$

$\text{P}(Y_2 - Y_1 > 100) = \text{P}\left(Z > \frac{100 - \text{E}(Y_2 - Y_1)}{\sigma/\ sqrtn}\right) = \text{P}\left(Z > \frac{100-650}{350}\right) = \text{P}(Z > -1.11)$

$1 - \Phi(1.11) = 1 - 0.133 = \mathbf{0.866}$