Question 5:

- Given that the algorithim compares the current element against either the stored max, or min in every iteration, and we start the iteration at $i=2$ (no comparison at $i=1$) we see that the total number of comparisons as a function of n is:

$$f(n) = n-1$$

Question 6:

- We can write the equation $1+2+3+\ldots+n = \frac{n(n+1)}{2}$ where $n \geq 1$ as:

$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$, Base Case: Prove for $n=1$, $\sum_{i=1}^{1} i = \frac{1(1+1)}{2} = 1$

Inductive Hypothesis: Assume the statement holds true for $k \in \{0, 1, \ldots, n\}$

$$\sum_{i=1}^{k} i = \frac{k(k+1)}{2}$$

Inductive Step: Prove for $k+1$ using the assumption above

$$\sum_{i=1}^{k+1} i = \sum_{i=1}^{k} i + (k+1) = \frac{k(k+1)}{2} + (k+1)$$

$$= \frac{k(k+1) + 2(k+1)}{2}$$

$$= \frac{k^2+k+2k+2}{2} = \frac{k^2+3k+2}{2}$$

$\therefore \sum_{i=1}^{k+1} i = \sum_{i=1}^{k} i + (k+1) = \frac{(k+1)(k+2)}{2}$, therefore this holds because when

$i = k+1$, $n = k+1$ and $n+1 = k+2$. $\therefore$ QED