Question 1

Prove the equivalence of the two code fragments below:

Code fragment 1

```c
if (x >= 20) y = 20;
else if (x <= 10) y = 10;
    else y = x;
```

Code fragment 2

```c
if (x > 10 && x < 20) y = x;
else if (x <= 10) y = 10;
    else y = 20;
```

Make sure that you strictly follow the if-then-else rule; use the same format as given in the class notes.

Question 2

Given the following code (assume that \(x\) and \(n\) are both positive integers),

```c
power = 1;
i = 1;
while (i <= n) {
    power = power * x;
i = i + 1;
}
```

prove that \(\left(\frac{x^n}{power}\right) \geq 1\) is an invariant for the while loop.

Make sure that you prove the invariant for the three cases: (i) before entering into the loop, (ii) at the end of the first iteration, and (iii) at the exit of the loop. Do not use examples in your proof.