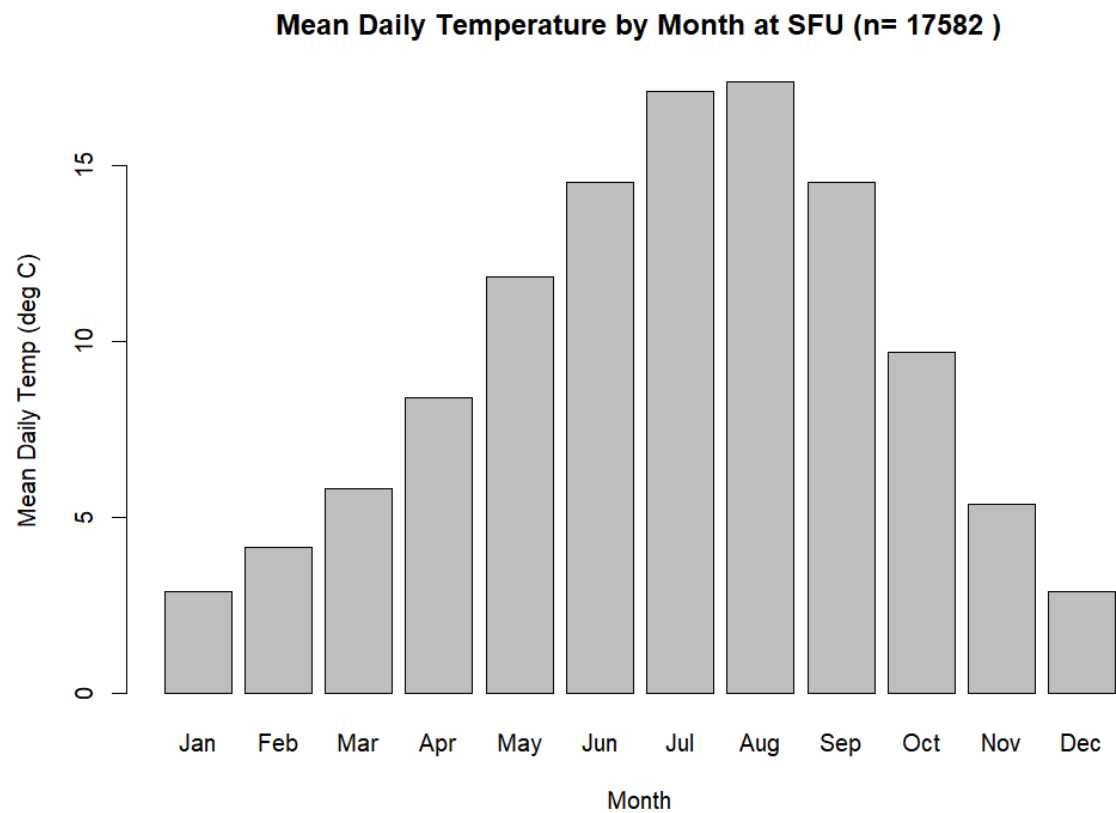
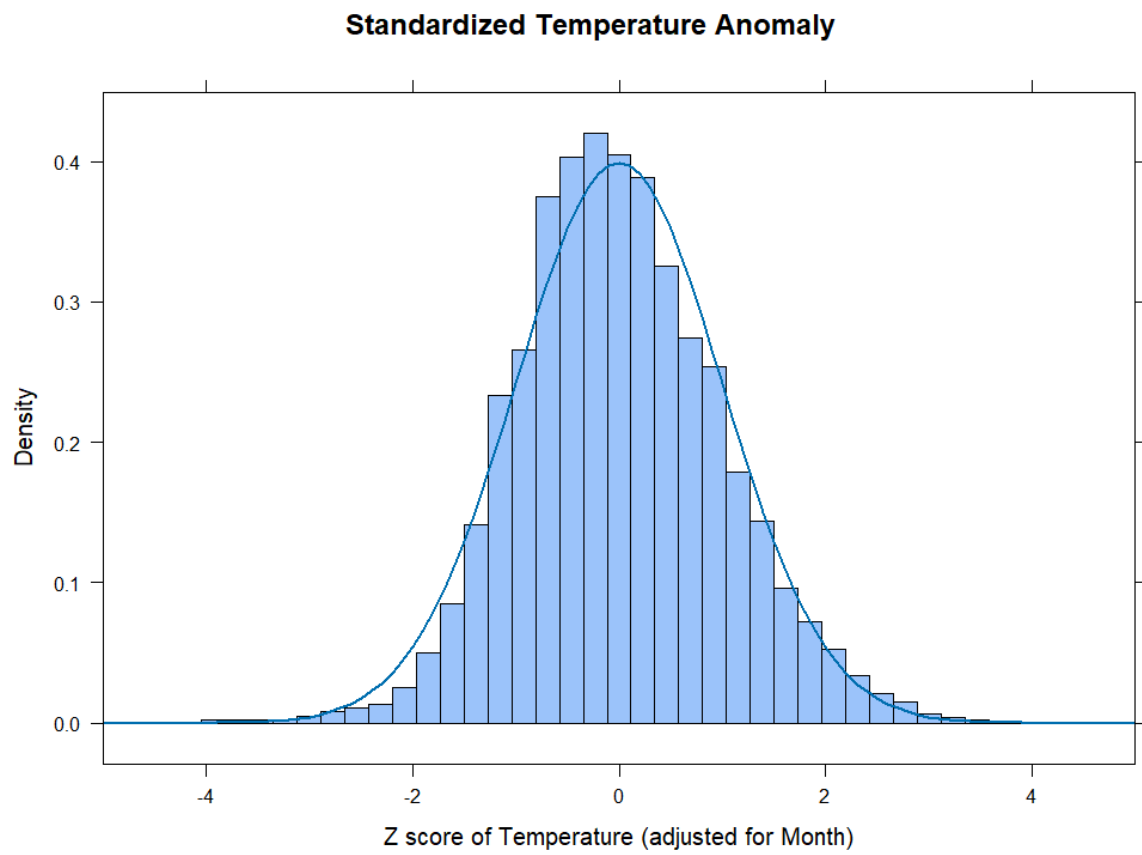


Q1

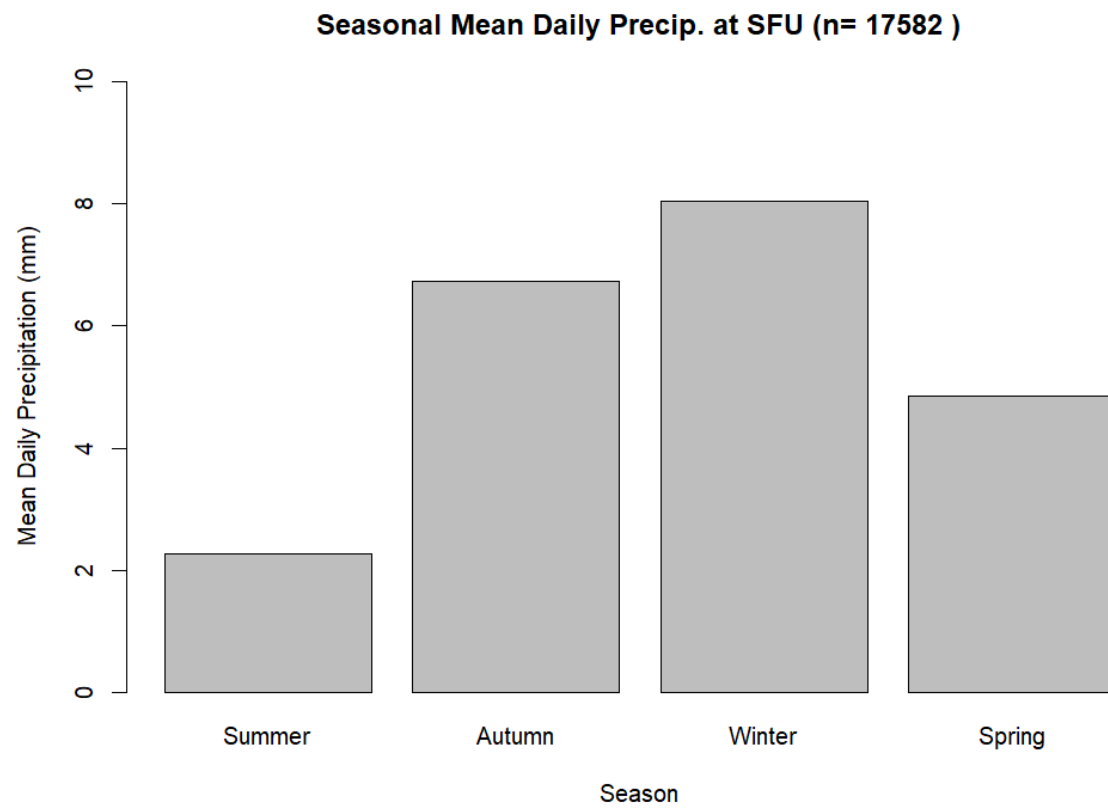


July and August are the warmest, and January and December are the coldest

Q2



Q4



Q5

```
> p_any <- mean(SFU.Weather$Total.Precip.mm > 0, na.rm = TRUE)
>
> w <- as.POSIXlt(SFU.Weather$Date)$wday
> p_mon <- mean((SFU.Weather$Total.Precip.mm > 0)[w == 1], na.rm = TRUE)
>
> independent <- abs(p_mon - p_any) < 0.01
> data.frame(P_any = p_any, P_mon = p_mon,
+           independent = abs(p_mon - p_any) < 0.01)
      P_any      P_mon independent
1 0.4878285 0.4876297          TRUE
```

$P(\text{Precip} > 0)$ and $P(\text{Precip} > 0 \mid \text{Monday})$ are almost equal, so they are independent.

Q6

```
> SFU.Weather$Temp.Seg <- factor(SFU.Weather$Temp.Seg, levels =
c("Cold", "Mid", "Warm"))
> tab <- table(SFU.Weather$Temp.Seg, SFU.Weather$Total.Precip.mm > 0)
>
> prop <- prop.table(tab, 1)[, "TRUE"]
> names(prop) <- c("P(>0|Cold)", "P(>0|Mid)", "P(>0|Warm)")
> prop
P(>0|Cold)  P(>0|Mid)  P(>0|Warm)
 0.5714522  0.4879113  0.3971326
```

Yes, it does, because the probability of precipitation is highest on cold days.

Q7

$$P(\text{Warm} \mid \text{Precip} > 0) = \frac{P(\text{Warm}) P(\text{Precip} > 0 \mid \text{Warm})}{P(\text{Warm}) P(\text{Precip} > 0 \mid \text{Warm}) + P(\text{Mid}) P(\text{Precip} > 0 \mid \text{Mid}) + P(\text{Cold}) P(\text{Precip} > 0 \mid \text{Cold})}$$

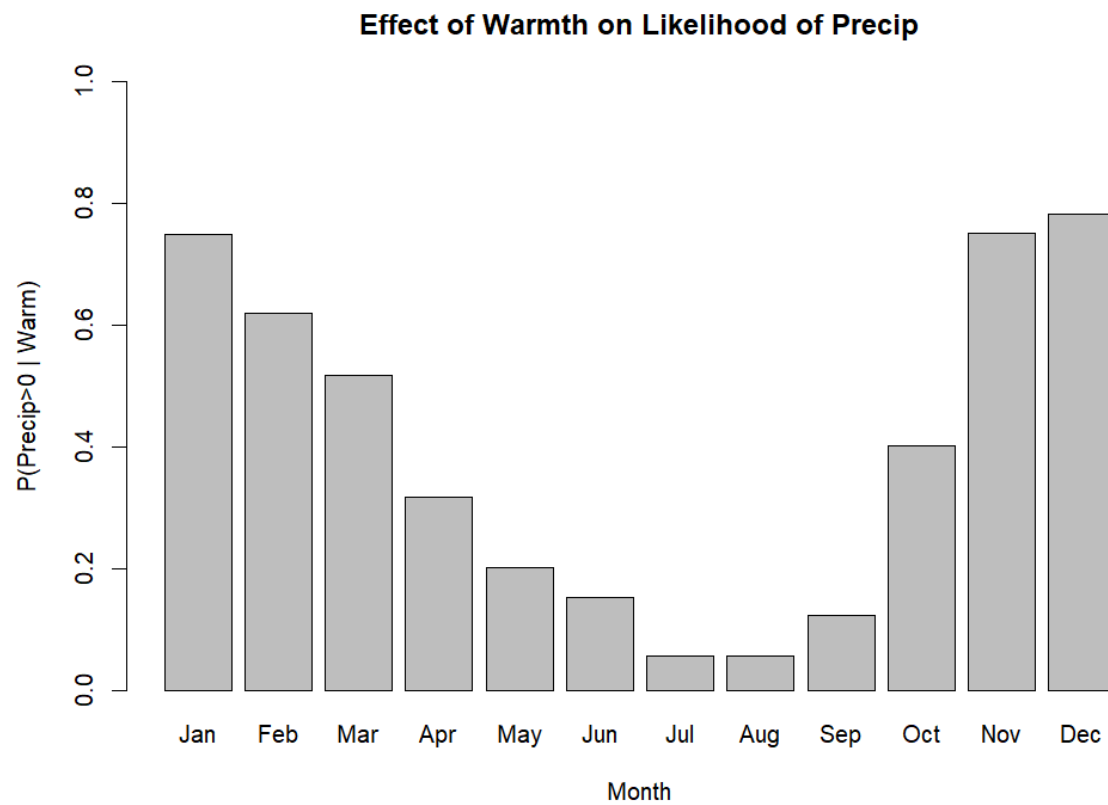
```
> P_warm <- sum(tab["Warm",]) / sum(tab)
> P_precip <- sum(tab[, "TRUE"]) / sum(tab)
> P_precip_given_warm <- tab["Warm", "TRUE"] / sum(tab["Warm",])
> P_precip_given_warm * P_warm / P_precip
[1] 0.2583654
```

Q8

```
> p <- prop.table(tab["Warm", , ], 1)[, "TRUE"]
> round(p, 5)
      Summer  Autumn  Winter  Spring
0.08699 0.42982 0.72125 0.34925
```

In general, precipitation is less likely on warm days; however, the seasonal effect is significant — warm days in winter are most likely to have precipitation, followed by autumn and spring, with summer being the least.

Q9



The highest is December, $P(\text{Precip} > 0 \mid \text{Warm}) \approx 0.78156$