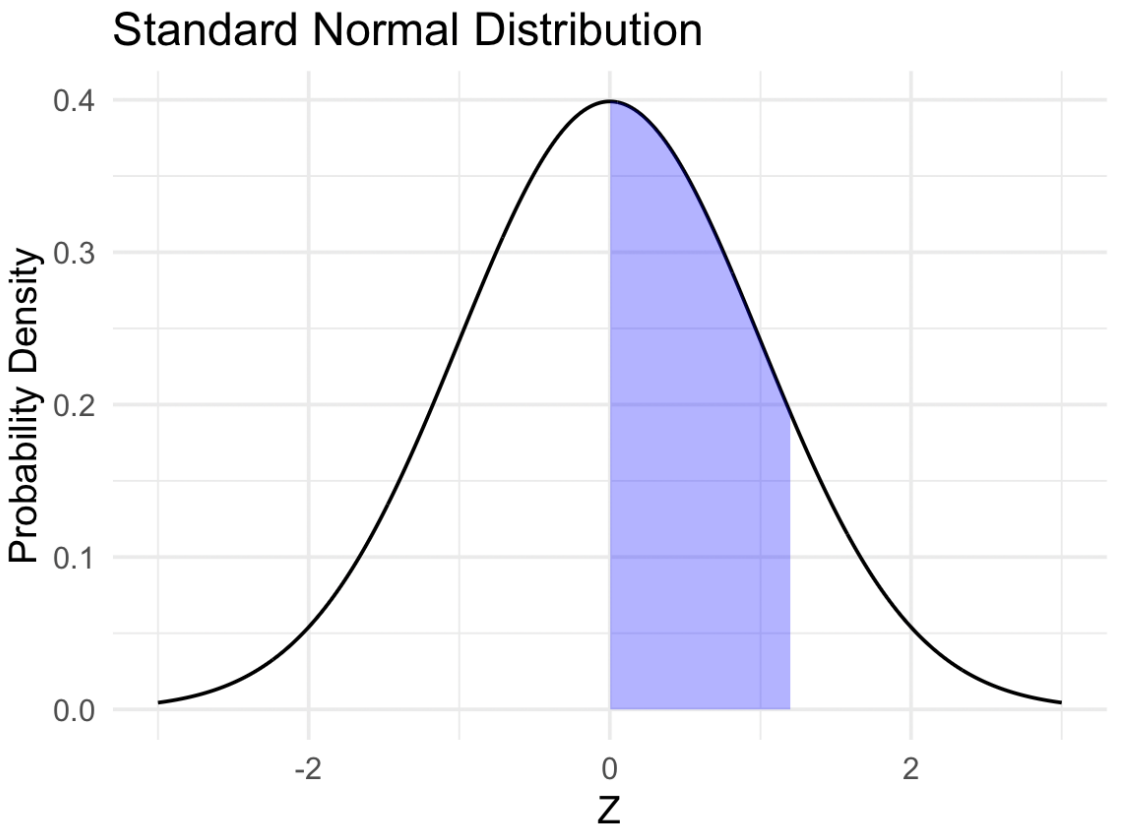
數理統計自主學習作業

4.58

```
> library(ggplot2)
>
>
> lower_bound <- 0
> upper_bound <- 1.2
>
> probability <- pnorm(upper_bound) - pnorm(lower_bound)
>
> cat("P(0 ≤ Z ≤ 1.2) =", round(probability, 4), "\n")
P(0 ≤ Z ≤ 1.2) = 0.3849
>
> x <- seq(-3, 3, length.out = 1000)
> y <- dnorm(x)
> df <- data.frame(x, y)
>
> ggplot(df, aes(x, y)) +
+   geom_line() +
+   geom_ribbon(data = df[df$x >= lower_bound & df$x <= upper_bound, ],
+               aes(ymax = y, ymin = 0), fill = "blue", alpha = 0.3) +
+   labs(title = "Standard Normal Distribution",
+        x = "Z",
+        y = "Probability Density") +
+   theme_minimal()
```



(a)(b)(c)(d)(e)

```
> pnorm(1.2, lower.tail = TRUE)-pnorm(0, lower.tail = TRUE)
[1] 0.3849303
>
> pnorm(0, lower.tail = TRUE)-pnorm(-0.9, lower.tail = TRUE)
[1] 0.3159399
>
> pnorm(1.56, lower.tail = TRUE)-pnorm(0.3, lower.tail = TRUE)
[1] 0.3227086
>
> pnorm(0.2, lower.tail = TRUE)-pnorm(-0.2, lower.tail = TRUE)
[1] 0.1585194
>
> pnorm(-0.2, lower.tail = TRUE)-pnorm(-1.56, lower.tail = TRUE)
[1] 0.3613603
```

4.86

(a)(b)

```
> pgamma(3.5,shape=1.5,rate=1/4, lower.tail= TRUE )
[1] 0.3741245
> pgamma(1.75,shape=1.5,rate=1/2, lower.tail= TRUE )
[1] 0.3741245
```

(c)輸出值相同

4.123

(a)(b)

```
> qbeta(0.95,4,3,lower.tail = TRUE)
[1] 0.8468389
> round(qbeta(0.95,4,3,lower.tail = TRUE),5)
[1] 0.84684
```