Week 9 plots

Stat 201: Statistics I

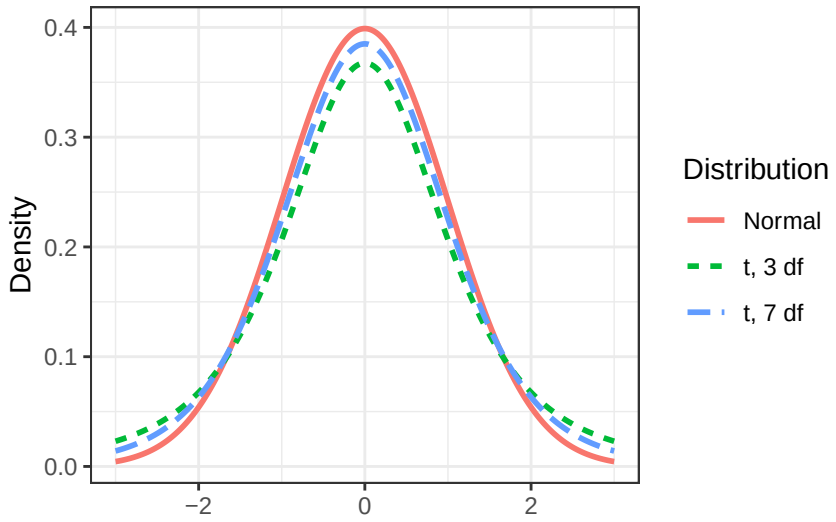
November 10, 2019

t distribution

```
x <- seq(-3, 3, length=1000)
y.norm <- dnorm(x)
y.t1 <- dt(x, 3)
y.t2 <- dt(x, 7)
td <- data.frame(x=rep(x,3), y=c(y.norm, y.t1, y.t2),
                 Distribution=c(rep("Normal",1000), rep("t, 3 df",1000), rep("t, 7 df", 1000)))

g.td <- ggplot(td, aes(x=x, y=y, color=Distribution, linetype=Distribution))
g.td <- g.td + geom_line(size=1)
g.td <- g.td + theme_bw() + xlab("") + ylab("Density")

g.td
```




```
ggsave('../wk09_t_dist.png', width=4.5, height=3, units = "in")
```

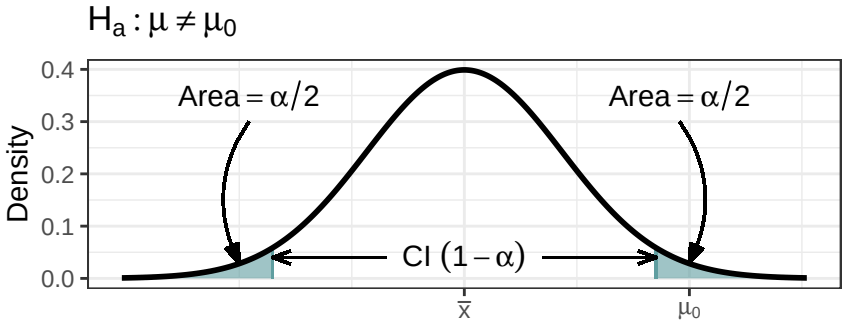
Two sided CI

```
x <- seq(-3.5, 3.5, length=1000)
y <- dnorm(x)
ci.2 <- data.frame(x=x, y=y)

g.ci.2 <- ggplot(ci.2, aes(x=x, y=y))

# Upper
g.ci.2 <- g.ci.2 + geom_area(data=ci.2[ci.2$x> 1.96,], fill='cadetblue', alpha=.6)
```

```
g.ci.2 <- g.ci.2 + geom_area(data=ci.2[ci.2$x< -1.96,], fill='cadetblue', alpha=.6)
g.ci.2 <- g.ci.2 + geom_segment(aes(x=1.96, y=0, xend=1.96, yend=dnorm(1.96)), color="cadetblue")
g.ci.2 <- g.ci.2 + geom_segment(aes(x=-1.96, y=0, xend=-1.96, yend=dnorm(-1.96)), color="cadetblue")
g.ci.2 <- g.ci.2 + geom_line(size=1)
g.ci.2 <- g.ci.2 + scale_x_continuous(breaks=c( 0, 2.3),
                                      labels=expression(bar(x), mu[0]))
g.ci.2 <- g.ci.2 + annotate("text", x=0, y=.04, label=expression(paste("CI ", (1-alpha))))
g.ci.2 <- g.ci.2 + geom_segment(aes(x=-.8, y=.04, xend=-1.96, yend=.04),
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="open"))
g.ci.2 <- g.ci.2 + geom_segment(aes(x=.8, y=.04, xend=1.96, yend=.04),
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="open"))
g.ci.2 <- g.ci.2 + annotate("text", x=2.2, y=.35, label=expression("Area" == alpha / 2))
g.ci.2 <- g.ci.2 + geom_curve(aes(x=2.2, y=.3, xend=2.3, yend=.03), curvature = -.3,
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="closed"))
g.ci.2 <- g.ci.2 + annotate("text", x=-2.2, y=.35, label=expression("Area" == alpha / 2))
g.ci.2 <- g.ci.2 + geom_curve(aes(x=-2.2, y=.3, xend=-2.3, yend=.03), curvature = .3,
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="closed"))
g.ci.2 <- g.ci.2 + theme_bw() +xlab("") + ylab("Density") + ggtitle(expression(H[a]: mu != mu[0]))
g.ci.2
```




```
ggsave('../wk09_two_ci.png', width=4.5, height=2, units = "in")
```

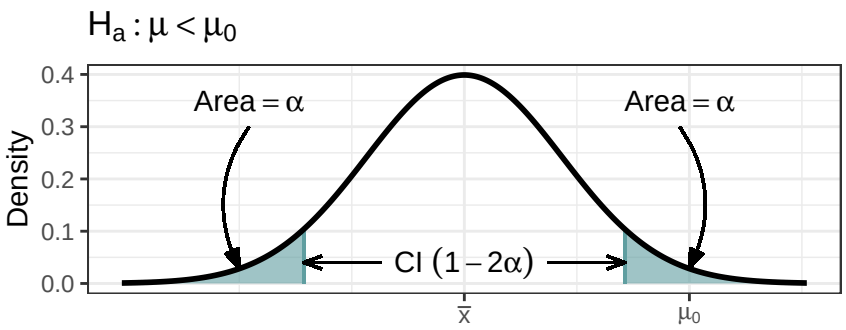
One sided CI

```
x <- seq(-3.5, 3.5, length=1000)
y <- dnorm(x)
ci.1 <- data.frame(x=x, y=y)

g.ci.1 <- ggplot(ci.2, aes(x=x, y=y))

# Upper
g.ci.1 <- g.ci.1 + geom_area(data=ci.1[ci.1$x> 1.64,], fill='cadetblue', alpha=.6)
g.ci.1 <- g.ci.1 + geom_area(data=ci.1[ci.1$x< -1.64,], fill='cadetblue', alpha=.6)
g.ci.1 <- g.ci.1 + geom_segment(aes(x=1.64, y=0, xend=1.64, yend=dnorm(1.64)), color="cadetblue")
g.ci.1 <- g.ci.1 + geom_segment(aes(x=-1.64, y=0, xend=-1.64, yend=dnorm(-1.64)), color="cadetblue")
g.ci.1 <- g.ci.1 + geom_line(size=1)
g.ci.1 <- g.ci.1 + scale_x_continuous(breaks=c( 0, 2.3),
                                      labels=expression(bar(x), mu[0]))
g.ci.1 <- g.ci.1 + annotate("text", x=0, y=.04, label=expression(paste("CI ", (1-2 * alpha))))
g.ci.1 <- g.ci.1 + geom_segment(aes(x=-.85, y=.04, xend=-1.64, yend=.04),
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="open"))
```

```
g.ci.1 <- g.ci.1 + geom_segment(aes(x=.85, y=.04, xend=1.64, yend=.04),
                                arrow=arrow(angle=20, length=unit(.1,"in"), type="open"))
g.ci.1 <- g.ci.1 + annotate("text", x=2.2, y=.35, label=expression("Area" == alpha))
g.ci.1 <- g.ci.1 + geom_curve(aes(x=2.2, y=.3, xend=2.3, yend=.03), curvature = -.3,
                              arrow=arrow(angle=20, length=unit(.1,"in"), type="closed"))
g.ci.1 <- g.ci.1 + annotate("text", x=-2.2, y=.35, label=expression("Area" == alpha))
g.ci.1 <- g.ci.1 + geom_curve(aes(x=-2.2, y=.3, xend=-2.3, yend=.03), curvature = .3,
                              arrow=arrow(angle=20, length=unit(.1,"in"), type="closed"))
g.ci.1 <- g.ci.1 + theme_bw() +xlab("") + ylab("Density") + ggtitle(expression(H[a]: mu < mu[0]))
g.ci.1
```




```
ggsave('../wk09_one_ci.png', width=4.5, height=2, units = "in")
```