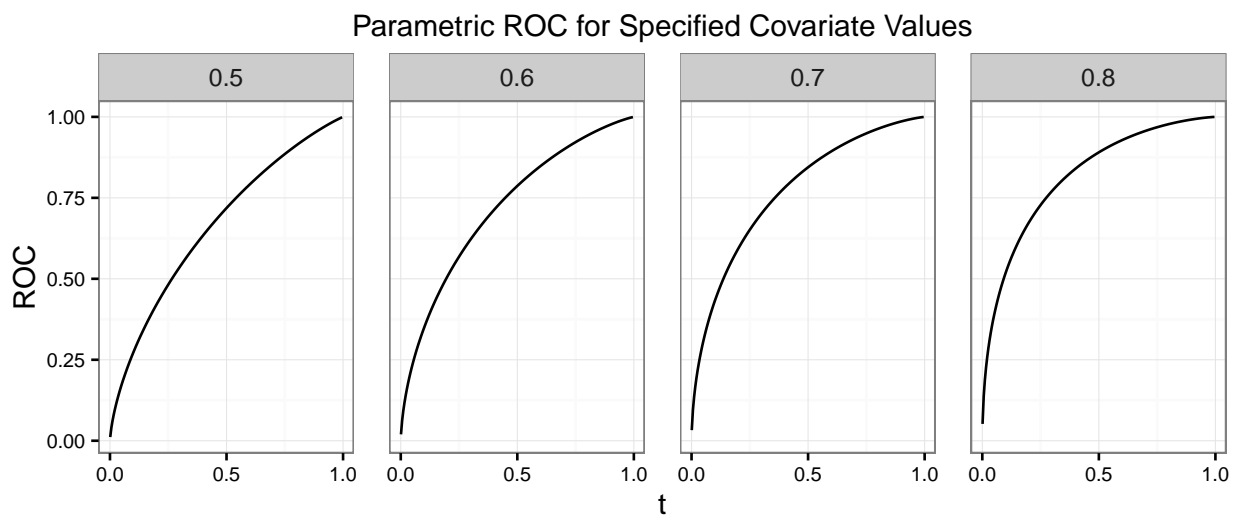


1 Binormal Example 2

Data simulated from $Y_D = 2 + 4X + \epsilon_D$ and $Y_{\bar{D}} = 1.5 + 3X + \epsilon_{\bar{D}}$, where $X \sim U(0, 1)$ and $\epsilon_D, \epsilon_{\bar{D}} \sim N(0, 1.5^2)$. In the following, we include the resulting ROC curves from each of the Parametric, Beta, and Semiparametric methods for specified values of the covariate X as well as the corresponding AUCs.

1.1 Parametric Method

```
##### output for alonzo
ggplot(dfParamP, aes(s, ROC)) + geom_line() + facet_grid(~x) + theme_bw() +
  labs(title = "Parametric ROC for Specified Covariate Values") +
  theme(axis.text=element_text(size=8),
        panel.margin = unit(1, "lines"), plot.title = element_text(size=12)) +
  scale_x_continuous(name="t", breaks=seq(0,1,.5))
```



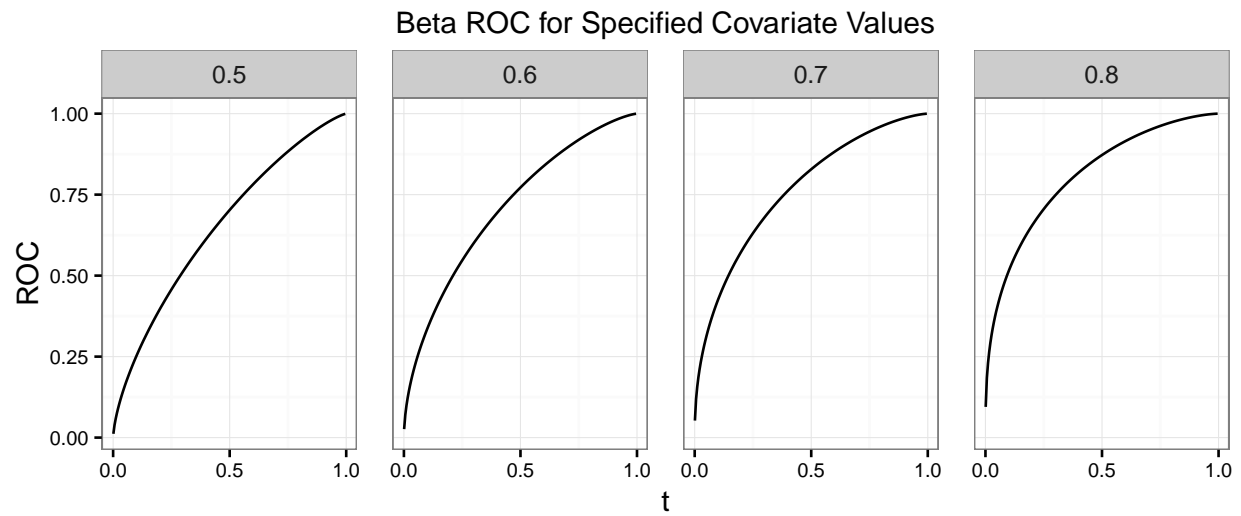
```
round(aucVecAP2,4)

## [1] 0.6605 0.7164 0.7674 0.8127

summary(probitMod)$coefficients

##           Estimate Std. Error  z value    Pr(>|z|)
## (Intercept) -0.5069567 0.02893779 -17.51884 1.028953e-68
## phiInv      0.9239606 0.02001170  46.17101 0.000000e+00
## x           2.1703373 0.05784119  37.52235 0.000000e+00
```

1.2 Beta Method



```
## [1] 0.6485 0.7064 0.7581 0.8031
## $mean
##           Estimate Std. Error  z value    Pr(>|z|)
## (Intercept)  0.706540  0.2182316  3.237569 1.205527e-03
## x            -2.673253  0.3983326 -6.711108 1.931516e-11
##
## $precision
##           Estimate Std. Error  z value    Pr(>|z|)
## (phi)  1.922075  0.2473206  7.771593 7.750529e-15
```

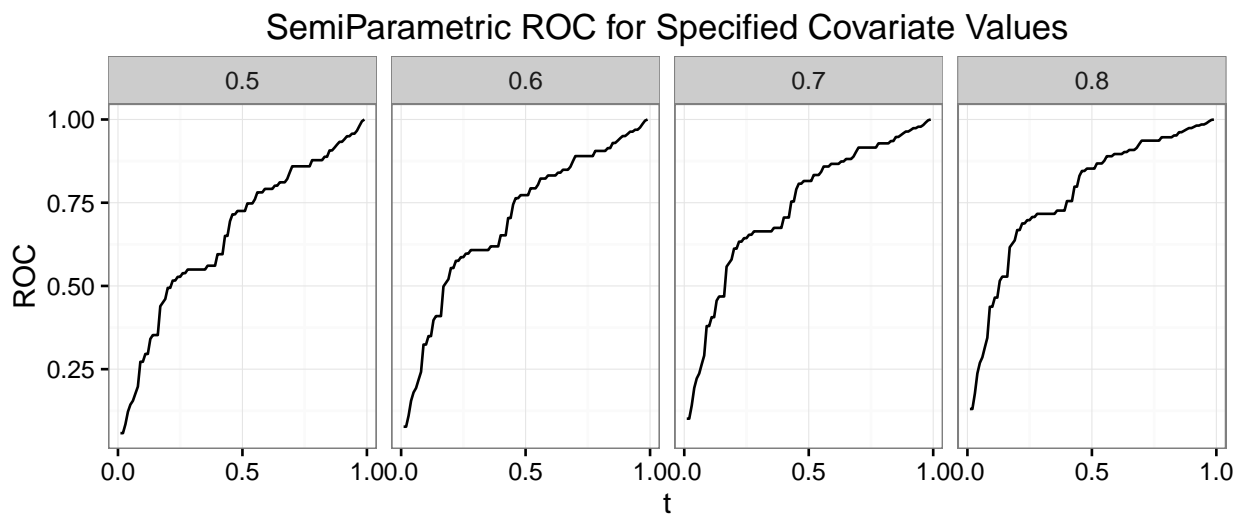
1.3 Semiparametric Method

```
# calculating AUC for specified values of covariate X
aucVecSemi2 <- sapply(covVec, function(x) auc(ROCdata, x))

truth <- sapply(covVec, function(x) pnorm((.5 + x)/sqrt(4.5)))

results <- data.frame("Truth" = truth, "Parametric" = aucVecAP2, "Semiparametric" = aucVecSemi2, "Beta" = betaVec)

label_names <- (c('1' = "0.5", '2' = "0.6", '3' = "0.7", '4' = "0.8"))
ggplot(ROCdata, aes(t, ROC)) + geom_line() + facet_grid(.~factor.x, labeller = as_labeller(label_names)) +
  theme(axis.text=element_text(size=8), panel.margin = unit(1, "lines"), plot.title = element_text(size=12)) +
  theme_bw()
```



```
round(aucVecSemi2,4)

## [1] 0.6475 0.6878 0.7256 0.7606

summary(probitMod1)$coefficients

##      Estimate Std. Error  z value      Pr(>|z|)
## xDiff 1.496059 0.04978701 30.04918 2.237613e-198
```

1.4 Plot Comparison

```
round(aucVecAP2,4)

## [1] 0.6605 0.7164 0.7674 0.8127

round(aucVecSemi2, 4)

## [1] 0.6475 0.6878 0.7256 0.7606

round(aucVecBeta2, 4)

## [1] 0.6485 0.7064 0.7581 0.8031

ggplot(FullPlot2, aes(x=FullPlot2$t, y=FullPlot2$ROC, group=label)) +
  facet_grid(~x) +
  geom_line(aes(colour = label), lwd = 1) +
  theme_bw() + labs(title = "ROC for Specified Covariate Values") +
  theme(axis.text=element_text(size=15), panel.margin = unit(1.5, "lines"),
        plot.title = element_text(size=14),
        strip.text.x = element_text(size = 10),
        legend.title= element_text(size = 10),
        legend.text = element_text(size = 10),
        text = element_text(size = 10)) +
  scale_x_continuous(name="t", breaks=seq(0,1,.5)) +
  scale_y_continuous(name="")+
  scale_colour_discrete(name = "Method", labels = c("Parametric", "Semiparametric", "Beta"))
```

