

Probability and Statistics (UCS410)

Experiment 4

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```
> # Q1
> X <- c(0,1,2,3,4)
> P <- c(0.41, 0.37, 0.16, 0.05, 0.01)
> print(sum(X * P))
[1] 0.88
> print(weighted.mean(X, P))
[1] 0.88
> print(c(X %*% P))
[1] 0.88
> |
```

```
> # Q2
> f <- function(t) 0.1 * exp(-0.1*t)*t
> ans = integrate(f, 0, Inf)
> # print(ans)
> print(ans$value)
[1] 10
>
```

```
> # Q3
> p <- c(0:3)
> q <- c(0.1,0.2,0.2,0.5)
> fun <- function(x) 12*x + 2*(3-x) - 18
> print(weighted.mean(fun(p), q))
[1] 9
> |
```

```

> # Q4
> first <- function(x) 0.5 * exp(-abs(x))*x
> second <- function(x) 0.5 * exp(-abs(x))*x*x
> first_moment = integrate(first, 1, 10)
> paste("Mean/First moment: " ,first_moment$value)
[1] "Mean/First moment: 0.367629741557749"
> second_moment = integrate(second, 1, 10)
> paste("Second moment: " ,second_moment$value)
[1] "Second moment: 0.916929207213094"
> var = second_moment$value - (first_moment$value * first_moment$value)
> paste("Variance: " ,var)
[1] "Variance: 0.781777580335277"
> |

```

```

> # Q5
> f <- function(x) (3 / 4) * (1 / 4)^(x - 1)
> p <- function(x) x^2
> x <- c(1:5)
> p5 <- p(x)
> print(p5)
[1] 1 4 9 16 25
> p(3)
[1] 9
> ans <- p5[3] * f(3)
> print(ans)
[1] 0.421875
> fm <- sum(f(x) * p5)
> print(fm)
[1] 2.182617
> sm <- sum(f(x) * p5 * p5)
> print(sm)
[1] 12.37793
> var <- sm - fm^2
> print(var)
[1] 7.614112
> |

```