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Math 560 Homework (#2)

Problem 1. Let $x_i = (i - 21)/10$ for $i = 1, \ldots, 41$. This creates an equally-spaced grid of values between -2 and 2 with increments of $1/10$.

Solution. (a) Write an R command to create a vector x with elements $x_1, ..., x_{41}$.

```
x <- ((1:41)-21)/10
```

(b) Let $u_i = \frac{1}{\sqrt{2\pi}} e^{-x_i/2}$ for $i = 1, ..., 41$. Write an R command to create a vector u with elements $u_1, ...u_{41}$.

```
u <- exp(-(1:41)/2)/sqrt(2*pi)
```

(c) Write an R command to give the elements of x corresponding to values of u_i which are greater than $\frac{1}{4}$.

```
x[u > 0.25]
```

PS: There no values in u that are greater than $\frac{1}{4}$. □

Problem 2. Type the following 3 command in R:

```
initials=c("GZ","VA","TK","BH","LM","EY")
quiz.grades=c(28,15,21,30,24,10)
exam.grades=c(86,72,50,97,90,55)
```

The i^{th} component of each vector gives the value of the respective variable for the i^{th} person in a class.

Solution. (a) The maximum possible number of points on the quiz is 30. Write an R command to convert the vector of quiz grades to a vector of percentages. (For example, a quiz grade of 27 should be converted to 90%.)

```
quiz.grades*(100/30)
```

(b) Students who scored at least 18 passed the quiz. Students who scored at least 60 passed the exam. Write an R command to give the initials of all students who both passed the quiz and passed the exam.

```
initials[quiz.grades>=18 & exam.grades>=60]
```

(c) Write an R command to add a 3 point curve to the vector of exam grades.

```
initials[quiz.grades>=18 & exam.grades>=60]
```

□

Problem 3. Consider two tosses of a fair coin.

Solution. (a) Let X be the number of heads minus the number of tails in the two tosses.

The possible events are:

HH	HT	TH	TT

Therefore the probability distribution of X is:

Value (X)	2	0	-2
Probability	0.25	0.5	0.25

(b) Let Y be the number of heads before the first time tails occurs. (If tails does not occur in the two tosses, then $Y = 2$.)

The possible events are:

HH	HT	TH	TT

Therefore the probability distribution of Y is:

Value (Y)	2	1	0
Probability	0.25	0.25	0.5

□