name: *Solution*

exam 1
math2228
18 oct 2019

- *you are allowed a half sheet of notes*
- *you are allowed a scientific calculator*
- *justify your answers*
- *no phones*
- *don't cheat... seriously*
- *if you do cheat, you receive a 0*
- *there are no makeup exams*
- **good luck!**

60 pts

1. Here's some data

25	32	42	31	75
32	43	37	22	33

(a) *(2 points)* Compute the standard deviation.
(b) *(2 points)* Make a stemplot.
(c) *(2 points)* Find the median and the quartiles.
(d) *(2 points)* Are there any outliers?

(a)

14.81

(c)

$Q_1 = 31$

$M = 32.5$

$Q_3 = 42$

(b)

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2 | 2 5
3 | 1 2 2 3 7
4 | 2 3
5 |
6 |
7 | 5
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(d)

75

2. For each of the following scenarios, classify each from the pair of variables as explanatory or response or neither. Justify your answer. *(2 points each)*

   (a) The number of ice cream cones sold and the number of boogie boards sold.

   (b) The market price of wheat and the cost of bread.

| (a) Neither. There's a lurking variable: season. | (b) • price of wheat is explanatory • cost of bread is response. |

3. Identify each of the following events as random or not. Justify your answer. *(2 points each)*

   (a) The height of a baseball thrown directly upwards at a velocity of 60 miles per hour.

   (b) It rains the day after tomorrow.

| (a) Not random. You can determine the entire trajictory beforehand. | (b) Random. |

4. Describe the sample space for the following random processes. *(2 points each)*

   (a) Simultaneously flip three coins

   (b) Will it rain next Thursday

| (a) H H H   T H H H H T   T H T H T H   T T H H T T   T T T | (b) yes , no |

5. Are the following events independent? *(2 points each)*

   (a) The sales of ice cream cones and the sales of boogie boards

   (b) When drawing two cards, the first card is an ace of spades and the second card is a heart.

| (a) yes | (b) no. The outcome of the first alters the prob. of the second. |

6. Here's a table of exams scores:

Student	Math Exam	English Exam
Audrey	98	86
Jen	82	76
Bobby	75	67
Marco	56	51
Jes	62	75

(a) *(4 points)* Draw a scatter plot of the data.
(b) *(2 points)* Compute the correlation.
(c) *(4 points)* Write the equation for the least-squares regression line.
(d) *(2 points)* Predict the grade of Manuel's English exam if he received a 79 on his math exam.

(a)

(b)

0.81

(c)

$y = 1.04 + 0.89x$

(d)

71.35
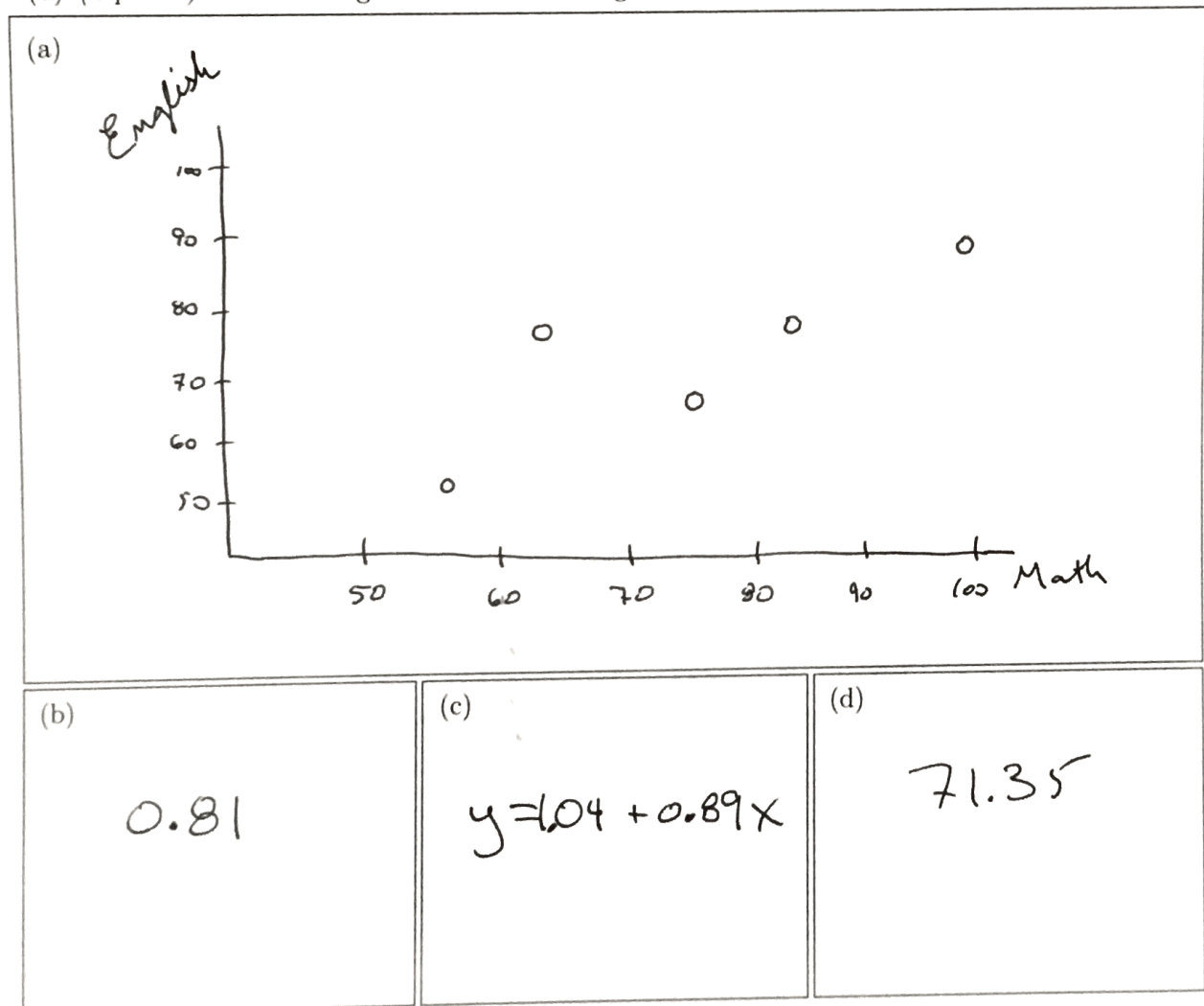
7. The following two-way table decribes the number of classes taken in two subjects organized by class standing.

Subject	Class Standing			
	Freshman	Sophmore	Junior	Senior
Math	2	6	8	9
English	3	5	6	8

(a) *(2 points)* write down the joint distribution
(b) *(4 points)* write down the marginal distributions
(c) *(2 points)* write down the distribution conditioned on the number of math classes taken

(a)

Fractional

$$\begin{array}{c|cccc} & F & S & J & S \\ \hline M & 2/47 & 6/47 & 8/47 & 9/47 \\ E & 3/47 & 5/47 & 6/47 & 8/47 \end{array}$$

Decimal (heavily rounded)

$$\begin{array}{c|cccc} & F & S & J & S \\ \hline M & .04 & .12 & .16 & .18 \\ E & .06 & .10 & .12 & .16 \end{array}$$

(b)

$$\begin{array}{c|c} M & 25/47 = .53 \\ E & 22/47 = .47 \end{array}$$

$$\begin{array}{cccc} F & S & J & S \\ \hline 5/47 & 11/47 & 14/47 & 17/47 \\ " & " & " & " \\ .11 & .23 & .30 & .36 \end{array}$$

(c)

$$\begin{array}{cccc} F & S & J & S \\ \hline 2/25 & 6/25 & 8/25 & 9/25 \\ " & " & " & " \\ .08 & .24 & .32 & .36 \end{array}$$

8. The probability distribution for the random variable associated to the number of heads obtained when tossing three fair coins is

X	0	1	2	3
P(X)	0.125	0.375	0.375	0.125

Compute the following. *(2 points each)*
  (a) Probability that you flip 2 heads?
  (b) Probability that you flip 2 or fewer heads?
  (c) Probability that you do not flip 3 heads?
  (d) $P(X > 1 \text{ or } X = 2)$

(a)	.375
(b)	.875
(c)	.875
(d)	.500

9. Let X be a continuous random variable with a uniform distribution such that $0 \le X \le 1$. Compute the following. *(2 points each)*
  (a) $P(X = 0.4)$
  (b) $P(0.2 \le X < 0.4)$
  (c) $P(0.26 \le X \le 0.54 \text{ or } 0.52 \le X \le 0.87)$
  (d) $P(0.26 \le X < 0.54 \text{ and } 0.52 \le X \le 0.87)$

(a)	O
(b)	.2
(c)	.61
(d)	.02