

(20pts) NAME (printed neatly): _____

(10pts) Section Number (circle correct section): 503 (10:20am) 521 (11:30am) 523 (1:50pm)

Quiz Grade: _____

1. There are 4 **different** green balls, 5 **different** purple balls, 2 **identical** yellow balls, and 3 **different** red balls.

a. (10 pts) If all the green, purple and red balls (no yellow balls) are lined up at random, what is the probability of getting all the balls of the same color next to each other? **Give answer as an exact fraction, do not reduce the fraction.**

$$\frac{3!4!5!3!}{12!} = \frac{103680}{479001600}$$

b. (10 pts) If 3 balls are selected at random from the 14 balls, what is the **exact probability** of getting 1 green, 1 purple and 1 red ball?

$$\frac{1G1P1R}{C(14,3)} = \frac{4 \cdot 5 \cdot 3}{364} = \frac{15}{91}$$

c. (10 pts) If 3 balls are selected at random from the 14 balls, what is the **exact probability, as a fraction in simplest terms**, of getting at least 2 purple balls?

$$\frac{C(5,2) \cdot C(9,1) + C(5,3)}{C(14,3)} = \frac{10 \cdot 9 + 10}{364} = \frac{100}{364} = \frac{25}{91}$$

d. (10 pts) If 3 balls are selected at random from the 14 balls, what is the **exact probability, as a fraction in simplest terms**, of getting at least 2 green balls or exactly 1 red ball?

$$\frac{C(4,2) \cdot C(10,1) + C(4,3) + C(3,1) \cdot C(11,2) - C(4,2) \cdot C(3,1)}{C(14,3)} = \frac{6 \cdot 10 + 4 + 3 \cdot 55 - 6 \cdot 3}{364} = \frac{211}{364}$$

2. The table shows the thousands of bacteria in a culture based upon the temperature.

| | | | | | |
|-----------------------------|----|----|----|----|----|
| x , degrees C | 35 | 40 | 45 | 50 | 55 |
| y , thousands of bacteria | 80 | 65 | 52 | 40 | 20 |

a. (10 pts) What is the best-fitting (linear regression) line that represents the data? ***Do not round your coefficients.***

LinReg L1, L2, Y1

$$y = -2.9x + 181.9 \text{ [thousands of bacteria for } x \text{ degrees C]}$$

b. (10 pts) Using the line of best fit, how many bacteria, ***to the nearest whole number***, would you predict if the temperature was 38 degrees C?

$$Y1(38) = 71.7 \text{ [this is in thousands]}$$

Predict **71,700 bacteria** at 38 degrees C

c. (10 pts) Using the line of best fit, at what temperature, ***to the nearest degree***, would you expect to have 30,000 bacteria?

$$Y2 = 30$$

Intersect

$$(52.37931\dots, 30)$$

$$\text{OR } 30 = -2.9x + 181.9$$

$$x = \frac{1519}{29} \approx 52.37931034$$

At **52 degrees C**, would predict to have 30,000 bacteria.