

**PSYC 240: Statistics in Psychology**  
**PRACTICE SET 1: MEASUREMENT AND DESCRIPTION**  
**PROBLEM-BASED QUESTION ANSWERS**

1. Suppose that the following frequency distribution represents the number of class periods students in a course attended over the semester (there were 30 class periods over the semester).

Step 1: Calculate the mean.

First add up all the numbers. This can be done by multiplying each score by its frequency, and then summing all of those numbers.  $(23*1) + (24*1) + (25*2) + (26*3) + (27*4) + (28*7) + (29*9) + (30*4) = 860$ . Then divide by N.  $860/31 = 27.74$

Step 2: Calculate the SD.

Create a table like the one shown in class and below. This will give you the sum of squares (SS).

Y	f	$(Y - M)^2 * f$
23.00	1	22.49
24.00	1	14.00
25.00	2	15.04
26.00	3	9.10
27.00	4	2.20
28.00	7	0.47
29.00	9	14.24
30.00	4	20.40
Total (•)	31	SS = 97.93

Now by knowing the SS, you can calculate the MS by dividing the SS by N-1.

$$\frac{97.93}{30} = 3.26$$

By taking the square root of the MS, you now have the SD.

$$\sqrt{3.26} = 1.81$$

b.

The score with a percentile of 35.5 is 28. The score with a percentile of 87.1 is 30.

c.

If the distribution was normal, the 50th percentile would be the mean, or 27.74. To get the 90th percentile, we would need to get a z score. By looking at the z table, we see that the z score with a PR of .900 is 1.28.

Thus,  $(z \cdot SD + M)$  will give us the raw score we need.

$(1.28 \cdot 1.81) + 27.74 = 30.06$ . This should make sense intuitively too, because 30 has a percentile of 87.1, so our answer to part C should be greater than 30.

2 a)

This is simply asking for the percentile of each score, so you need to find the z scores first.

i)  $45-57/10 = -1.2$       PR = **.115 or 11.5%**

ii)  $63-57/10 = .6$       PR = **.726 or 72.6%**

b) This part is asking for the percentage above, so you need to take 1-PR for the answer.

i)  $59-57/10 = .2$       PR = .579,  $1-.579 =$  **.421, or 42.1%**

ii)  $42-57/10 = -1.5$       PR = .067,  $1-.067 =$  **.933 or 93.3%**

c) This part is asking for the percentage between several scores, so you will need to find the percentage below and above the scores to get the answer.

i)  $63-57/10 = .6$       and       $80-57/10 = 1.3$

The PR for .6 is .726 and 1-PR for 1.3 is .097.

So 72.6% of scores are below this range and 9.7% of scores are above this range. Since we want to find what is between, and we know the numbers need to add to 100%, we can add the percentages that fall outside the range and then subtract from 100.

$72.6 + 9.7 = 82.3$        $100 - 82.3 =$  **17.7%**

ii)

$47-57/10 = -1.0$        $63-57/10 = .6$

PR for -1.0 is .159      1-PR for .6 is .274

So,  $15.9\% + 27.4\% = 43.3\%$

$100 - 43.3\% = \mathbf{56.7\%}$

iii)

$47-57/10 = -1.0$        $55-57/10 = -0.2$

PR for  $-1.0$  is  $.159$        $1$ -PR for  $-0.2$  is  $.579$

So,  $15.9\% + 57.9\% = 73.8\%$

$100 - 73.8\% = \mathbf{26.2\%}$

3) If the distribution is normal, then we can assume symmetry which will make the process easier.

The middle 90% should have 5% at the bottom and 5% at the top, so we should look up the PR of  $.05$  for the lower  $z$  score and  $.95$  for the upper  $z$  score.

PR of  $.05 = -1.64$       PR of  $.95 = 1.64$

Then translate back into raw scores with  $z \cdot SD + M$

$-1.64 \cdot 16 + 100 = \mathbf{73.76}$       and       $1.64 \cdot 16 + 100 = \mathbf{126.24}$

ii)

Find PRs of  $.025$  and  $.975$

$z = -1.96$  and  $z = 1.96$

$-1.96 \cdot 16 + 100 = \mathbf{68.64}$       and       $1.96 \cdot 16 + 100 = \mathbf{131.36}$

iii) Find PRs of  $.005$  and  $.995$

$z = -2.6$  and  $z = 2.6$  Answers: **58.4 through 141.6**