Spring '05/MAT 117/Exam 4a **Name:** Solution *Show all your work.*

angle = (relative frequency) $\cdot$ 360° $\quad Z = \dfrac{X-\mu}{\sigma}$

$$\mu = \frac{x_1 + x_2 + \cdots + x_n}{n} \qquad \sigma = \sqrt{\frac{(x_1-\mu)^2 + (x_2-\mu)^2 + \cdots + (x_n-\mu)^2}{n}}$$

$$\mu = \frac{f_1x_1 + f_2x_2 + \cdots + f_nx_n}{f_1 + f_2 + \cdots + f_n} \qquad \sigma = \sqrt{\frac{f_1(x_1-\mu)^2 + f_2(x_2-\mu)^2 + \cdots + f_n(x_n-\mu)^2}{f_1 + f_2 + \cdots + f_n}}$$

1. (10pts) A middle school basketball team played 8 games. The numbers of points they scored in those games are 36, 76, 45, 46, 113, 63, 34 and 35.
a) Find the team's median score.
b) Find the team's mean score.
c) Find the standard deviation of scores.

a) In increasing order: 34, 35, 36, 45, 46, 63, 76, 113

middle two

$$\text{median} = \frac{45+46}{2} = 45.5$$

b) $$\mu = \frac{34+35+36+45+46+63+76+113}{8} = \frac{448}{8} = 56$$

c) $$\sigma^2 = \frac{(34-56)^2 + (35-56)^2 + \cdots + (76-56)^2 + (113-56)^2}{8}$$

$$= \frac{5249}{8} = 655.5$$

$$\sigma = 25.6$$

2. (13pts) A Calculus 1 class had the final grades given in the table. Assume the usual association of grades with numbers (A=4, B=3, C=2, D=1, E=0).

a) What is the mode grade? A

b) Find the median.

c) Find the mean.

d) Find the standard deviation.

Grade	Frequency
A 4	6
B 3	3
C 2	5
D 1	4
E 0	4
	22

11th 12th

b): $\underbrace{0,0,0,0}_{4}, \underbrace{1,1,1,1}_{4}, \underbrace{2,2,2,2,2}_{5}, \underbrace{3,3,3}_{3}, \underbrace{4,4,4,4,4,4}_{6}$

Need 11th : 2 12th : 2 median $= \frac{2+2}{2} = 2$

c) $\mu = \frac{6\cdot4 + 3\cdot3 + 5\cdot2 + 4\cdot1 + 4\cdot0}{22} = 2.14$

d) $\sigma^2 = \frac{6(4-2.14..)^2 + 3(3-2.14)^2 + 5(2-2.14..)^2 + 4(1-2.14..)^2 + 4(0-2.14..)^2}{22}$

$= \frac{46.59}{22} = 2.1177..$

$\sigma = \sqrt{2.1177..} \approx 1.46$

3. (10pts) The number of people living in each house of a particular neigborhood is shown below.

a) Find the relative frequencies for each class.

b) Find the appropriate angles and draw a pie chart for the data.

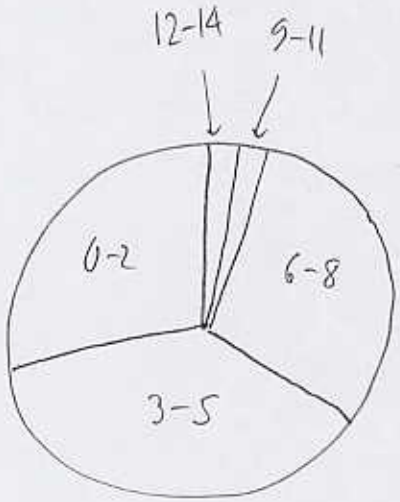
c) Estimate the mean (find representative values first).

People in house	Number of houses	Relative frequency	Angle	Representative value
12–14	3	0.02	6.59	13
9–11	6	0.04	13.17	10
6–8	36	0.22	79.02	7
3–5	74	0.45	162.44	4
0–2	45	0.27	98.78	1
	164			

$$\mu \approx \frac{3\cdot 13 + 6\cdot 10 + 36\cdot 7 + 74\cdot 4 + 45\cdot 1}{164}$$

$$\approx 4.22$$

b)



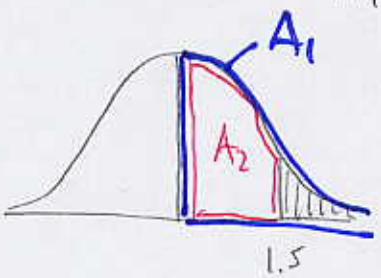
4. (10pts) Compute the following probabilities for a standard normal distribution. Draw a picture showing which area you are computing.

a) $P(Z < 0.35)$ $= A_1 + A_2 = 0.5 + 0.1368$

$= 0.6368$

b) $P(1.5 \leq Z)$ $= A_1 - A_2 = 0.5 - 0.4332$

$= 0.0668$



5. (7pts) Scores on the mathematics SAT test in 1997 were approximately normally distributed with mean 511 and standard deviation 112. What percentage of scores lies in the range 400–600? Draw a picture showing which area you are computing.

$$P(400 \le X \le 600) = P\left(\frac{400-511}{112} \le Z \le \frac{600-511}{112}\right)$$

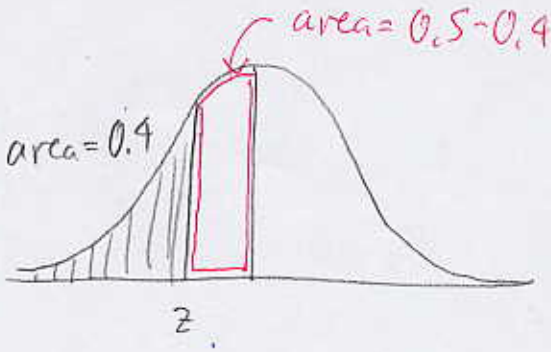
$$= P(-0.99 \le Z \le 0.79)$$

$$= A_1 + A_2 = 0.3389 + 0.2852$$

$$= 0.6241$$

62.41% of scores

Bonus. (5pts) In a standard normal distribution, which score falls at the 40th percentile?



Closest number in table to 0.1 is 0.0987, corresponding to $z = 0.25$

-0.25 is 40th percentile