

## Grading on a (Normal Model) Curve

Scores on a 100 point statistics exam are modeled using a normal model with  $\mu = 72$  and  $\sigma = 8$ .

1. Suppose the professor uses a straight percentage scale, that is 90 and above is an A, 80 up to 90 is a B, 70 up to 80 is a C, 60 up to 70 is a D and below 60 is an F.

- (a) With this scale, what proportion of students will get F's?

$$z = \frac{60 - 72}{8} = \frac{-12}{8} = -1.5$$

Table Z: 0.0668

6.68%

- (b) With this scale, what proportion of students will get A's?

$$z = \frac{90 - 72}{8} = \frac{18}{8} = 2.25$$

Table Z: 0.9878

$$1 - 0.9878 = 0.0122$$

1.22%

- (c) With this scale, what proportion of students will get C's?

$$z_1 = \frac{70 - 72}{8} = \frac{-2}{8} = -0.25 \quad z_2 = \frac{80 - 72}{8} = \frac{8}{8} = 1.00$$

Table Z: 0.4013

Table Z: 0.8413

$$0.8413 - 0.4013 = 0.4400$$

44%

2. Suppose the professor wants to set a scale so that 18% of students get A's, 26% of students get B's, 38% of students get C's, 14% of students get D's and 4% of students get F's.

(a) What should the cutoff for A's be?

$$z = 0.92$$

$$0.92 = \frac{\text{cutoff} - 72}{8}$$

$$\text{cutoff} = 72 + 0.92(8) = 79.36$$

All students with scores above 79.36 will get A's.

(b) What is the cutoff for an F?

$$z = -1.75$$

$$-1.75 = \frac{\text{cutoff} - 72}{8}$$

$$\text{cutoff} = 72 - 1.75(8) = 58$$

All students with scores below 58 will get F's.

(c) What is the lowest score you can get, and still get a C?

4% + 14% = 18% of students will get F's and D's.

$$z = -0.92$$

$$-0.92 = \frac{\text{cutoff} - 72}{8}$$

$$\text{cutoff} = 72 - 0.92(8) = 64.64$$

Students who get above 64.64 will get at least a C.