MAT 125 Homework 9 Solutions

1. (a) Both curves have the same mean, $\mu = 0$. The amplitude of the solid curve is about 0.78 and that of the dashed curve about 0.26.

(b) The dashed curve is broader and more spread out, and therefore has the larger dispersion.

(c) Since the amplitude $= \dfrac{1}{\sqrt{2\pi}\,\sigma}$, the ratio of the dispersions is

$$\frac{\sigma\ (\text{dashed})}{\sigma\ (\text{solid})} = \frac{\text{amplitude (solid)}}{\text{amplitude (dashed)}}$$

$$= \frac{0.78}{0.26} \qquad \boxed{= 3}.$$

The dispersion of the dashed curve is three times larger than that of the solid curve.

2. (a) The life expectancy would likely be roughly normal. The lifetimes of electronic components are such that some fail very quickly, and these are eliminated from the sample to be sold by testing after the ovens are manufactured.

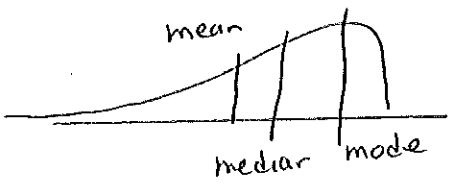
(b) A uniform distribution. A fair die comes up with

equal number of times the faces (numbered 1 through 6) are tossed.

(c) Most of the teachers will have salaries lower than typical at a school because they are just starting out, so the sample of salaries will be skewed to the left.

(d) This will be a bimodal distribution: women are shorter than men.

3. A distribution skewed to the left looks like



The mode, the most common value, will be larger than the median, because there are a lot of low values. The mean is even smaller for the same reason.

4. Some examples:

- heights of trees: skewed to the left, because small trees grow from seeds but are often unable to reach great heights because of being shadowed by other trees
- annual incomes in the US: pretty well J-shaped because the 1% have taken a very large

Homework 9 Solutions

fraction of the country's wealth

- ages of soldiers killed in combat : skewed to the ~~left~~ right because most though not all combat soldiers are young

- ~~&~~ Salaries of scientists working in a university lab : bimodal, because many are graduate students, who make lower incomes than the professors

- number of presidents in each century. this is pretty well uniform because the presidential term has a fixed length.

5. (a) $z = 0.1 - 0.15$ ~~0/0~~ Fraction = 0.06 = ~~&~~ by symmetry

$z = 0$ to 0.82 = ~~&~~ 0.294

Since the normal curve is symmetric this is the same as the fraction of data between $z = 0$ and -0.15 and -0.82. So the fraction of data between $z = -0.15$ and -0.82 is

$0.294 - 0.06 = 0.288 =$ **28.8%**

(b) Fraction between $z = 0$ and $z = +1.99$ is 0.477, and this is the same as the fraction between $z = -1.99$ and 0 by symmetry. So the fraction of data with $z < -1.99$ is $0.5 - 0.477 = 0.023 =$ **2.3%**

Homework 9 Solutions

16. (a) Children watching TV for more than 1750 hours:

$$z(1750) = \frac{1750-1600}{100} = \frac{150}{100} = 1.5$$

So z (0 to 1.5) from Table 1 is 0.433. So fraction with $z > 1.5$ is $0.5 - 0.433 = 0.067 = \boxed{6.7\%}$

(b) Children watching less than 1400 hours

$$z_{1400} = \frac{1400-1600}{100} = -2$$

$z(0-2) = z(-2 \to 0) = 0.477$

So fraction of kids watching less than 1400 hours per year $= 0.5 - 0.477 = 0.023 = \boxed{2.3\%}$

(Any opinions on fraction or percent of children succeeding in school??)