

This quiz covers material from section 8.3. Show your work.

1. (4 points) A survey of the ages University students is conducted. In the 17–23 age range, the following data are obtained.

Age	% of students
17	1%
18	26%
19	23%
20	19%
21	16%
22	10%
23	5%

a. (2 pts) Calculate the expected age of a randomly selected student.

**Answer:**

$$\begin{aligned} E(X) &= (.01)(17) + (.26)(18) + (.23)(19) + (.19)(20) + \\ &\quad (.16)(21) + (.10)(22) + (.05)(23) \\ &= 19.73 \end{aligned}$$

b. (2 pts) Calculate the variance of this distribution

**Answer:**

$$\begin{aligned} Var(X) &= (.01)(17 - 19.73)^2 + (.26)(18 - 19.73)^2 + (.23)(19 - 19.73)^2 + \\ &\quad (.19)(20 - 19.73)^2 + (.16)(21 - 19.73)^2 + \\ &\quad (.10)(22 - 19.73)^2 + (.05)(23 - 19.73)^2 \\ &\approx 2.29 \end{aligned}$$

2. (4 points) Acme Stanley Investments offers two mutual funds. The anticipated returns from price appreciation and dividends (in hundreds of dollars) are described by the following probability distribution:

**Mutual Fund A**

Returns	Probability
-10	.15
-5	.2
0	.1
5	.2
10	.35

### Mutual Fund B

Returns	Probability
-10	.2
-5	.1
0	.3
5	.3
10	.1

- a. (2 pts) Calculate the expected return of both mutual funds. Which is greater?

**Answer:**

$$E(A) = (.15)(-10) + (.2)(-5) + (.1)(0) + (.2)(5) + (.35)(10) = 2$$

$$E(B) = (.2)(-10) + (.1)(-5) + (.3)(0) + (.3)(5) + (.1)(10) = 0$$

Mutual fund A has a greater expected return.

- b. (2 pts) Calculate the standard deviation of each and indicate which investment would have a lower element of risk.

**Answer:**

$$\begin{aligned} \text{Var}(A) &= (.15)(-10 - 2)^2 + (.2)(-5 - 2)^2 + (.1)(0 - 2)^2 + \\ &\quad (.2)(5 - 2)^2 + (.35)(10 - 2)^2 = 56 \end{aligned}$$

$$\begin{aligned} \text{Var}(B) &= (.2)(-10)^2 + (.1)(-5)^2 + (.3)(0)^2 + \\ &\quad (.3)(5)^2 + (.1)(10)^2 = 40 \end{aligned}$$

So  $\sigma(A) = \sqrt{56} \approx 7.48$  and  $\sigma(B) = \sqrt{40} \approx 6.32$ . So B has the lower standard deviation, which means it has a lower element of risk.