**MA 207 Probability Distributions Group Members:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. You roll a pair of fair six-sided dice. Let *X* be the sum of the numbers showing.
   1. Find *P(X=2).*
   2. Find *P(X=5)*.
   3. Finish the table below which describes the **probability distribution** of *X*, which is denoted by *p(x) = P(X=x)*.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***x*** | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***p(x)*** | 1/36 | 2/36 | 3/36 | 4/36 | 5/36 | 6/36 | 5/36 | 4/36 | 3/36 | 2/36 | 1/36 |

* 1. Find the **expected value**, or **mean** of X.

E(X) = 2(1/36) + 3(2/36) + 4(3/36) + 5(4/36) + 6(5/36) + 7(6/36) + 8(5/36) + 9(4/36) + 10(3/36) +11(2/36) + 12(1/36)

= **7** **(The standard deviation is even more annoying)**

1. At a certain community college, pick a student at random and record their age,  The distribution is approximately **normal** with a mean of 33 years and a standard deviation of 5 years.
   1. Pick one individual student at random. Find the probability that this student is younger than 43. Shade a region under a labeled normal curve to represent your answer.

Z = (43 – 33) / 5 = 2 **(need a picture here)**

P(X < 43) = P(Z < 2) = **.97.5** **<- 68-95-99.7 rule**

* 1. Pick one individual student at random. Find the probability that this student is older than 28. Shade a region under a labeled normal curve to represent your answer.

Z = (28 – 33) / 5 = -1 **(need a picture here)**

P(X > 28) = P(Z > -1) = **.84**

* 1. Find the z-score for a 35 year-old.

Z = (35 – 33) / 5 = **.40**

* 1. Pick one individual student at random. Find the probability that this student is between 26 and 29. Here you will need the standard normal table.

Zupper = (29 – 33) / 5 = -.80 Zlower = (26 – 33) / 5 = - 1.40 **<- Need z-scores to look up on SNT**

P(26 < X < 29) = P(-1.40 < Z < -.80) = .2119 - .0808 = **.1311** **<- numbers from SNT**

* 1. Pick one individual student at random. Find the probability that this student is older than 30.

Z = (30 – 33) / 5 = -.60 P(X > 30) = P(Z > -.60) = 1 – P(Z < -.60) = 1 - .2743 = **.7257**

* 1. Pick one individual student at random. Find the probability that this student is younger than 35.

Z = (35 – 33) / 5 = .40 P(X < 35) = P(Z < .40) = **.6554 <- number from SNT**

* 1. How old is an individual at the 90th percentile?

**Use the SNT backwards!**

P(Z < Z0) = .90 => Z0 = 1.28 => (X – 33) / 5 = 1.28 => **X = 39.4 years old**