Regression:

Use your calculator to find the model for each of the following problems. Then, use your model to answer the following questions.

1. The table below shows the New York Yankees' payroll(in millions of dollars) from 1997 to 2004. Use your calculator to find the quadratic model that best fits the data.

Years since 1997	0	1	2	3	4	5	6	7
Payroll	59	63	88	93	112	126	153	184

Quadratic Model: $y = 1.48x^2 + 6.94x + 59.42$

a) What would you estimate the payroll to be this year, 2012? $x = 15$

$y = 496.52$ millions

b) What would you estimate the payroll to be in 2015? $x = 18$

$y = 663.86$ millions

2. The table below shows the speed, y measured in feet per second, of a space shuttle x seconds after its launch. Find the cubic model for the data.

x	10	20	30	40	50	60	70	80
y	202.4	463.3	748.2	979.3	1186.3	1421.3	1795.4	2283.5

Cubic Model:

$y = 0.006x^3 - 0.739x^2 + 48.956x - 235.886$

a) How fast will it be traveling 90 seconds after launch? $x = 90$

$y = 2920.72$ ft/sec

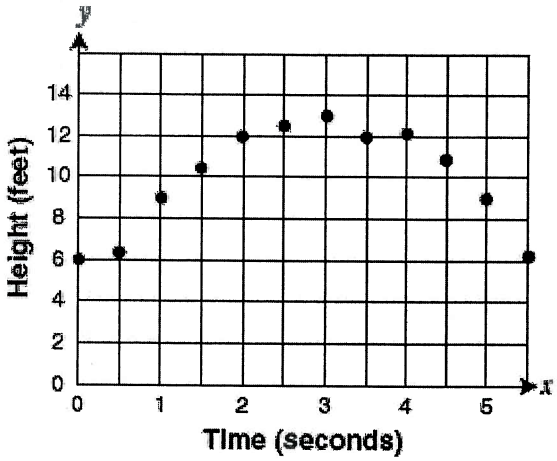
For a psychology report, Cathy compared the length in minutes of her little brother's afternoon nap with the hours of sleep he received the previous night.

Hours of Sleep x	Minutes of Naptime y
4.5	160
5.5	160
6.0	170
7.0	130
7.5	120
8.0	90
8.0	180
8.5	80
8.5	120
9.0	100
9.5	60
10.0	90
10.5	0
11.0	30

Which is most likely the line of best fit for the data?

A $y = -23.39x + 296.04$
B $y = -0.03x + 11.26$
C $y = 11.26x - 0.03$
D $y = 296.04x - 23.39$

50 Larry made a scatterplot showing the apparent height of a football at one-second intervals during the time period the ball was in the air.



Which is most likely the equation for the curve of best fit for the relationship?

F $y = -0.4x + 9.0$
G $y = 9.0x + 0.4$
H $y = 5.3x^2 - 0.9x + 4.9$
J $y = -0.9x^2 + 5.3x + 4.9$

This table of ordered pairs contains elements of a function of x.

x	y
0	11
1	6
2	3
3	2
4	3

Which equation could define the function?

F $y = -5x + 11$

G $y = -2x + 11$

H $y = (x - 3)^2 + 2$

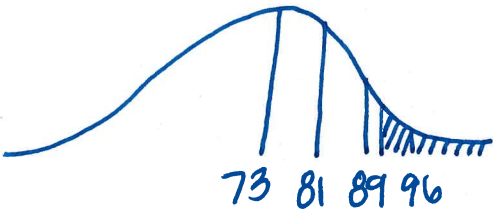
J $y = (x - 2)^2 + 7$

Normal and Standard Normal Distributions

For each section, draw the normal curve, shade the area under the curve to represent each question, and include the calculator command needed to solve the problem.

A set of final examination scores in a calculus course was found to be normally distributed with a mean of 73 and standard deviation of 8.

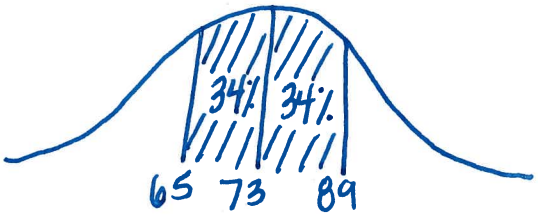
- What proportion of students earned at most a grade of 91 on the exam? (decimal)



normalcdf(91, 999, 73, 8) = 0.012

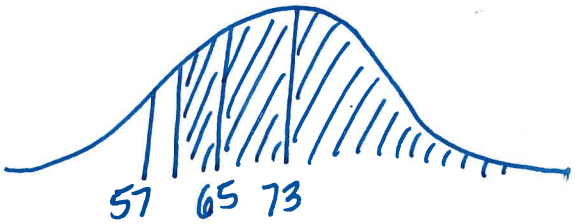
2nd VARS 2

- What percentage of students scored between a 65 and 89 on the exam?



68%

- What percentage of students scored earned a passing score on the exam (60 or higher)?



normalcdf(60, 999, 73, 8) = 0.9479

94.79%

- How high must a student score in order to place in the top 5% of all students?

(95 percentile)

InvNorm(0.95, 73, 8) = 86.16

2nd VARS 3

- If 137 students are taking Calculus, how many do you expect would earn a passing score on the exam?

94% earned a passing score or higher.

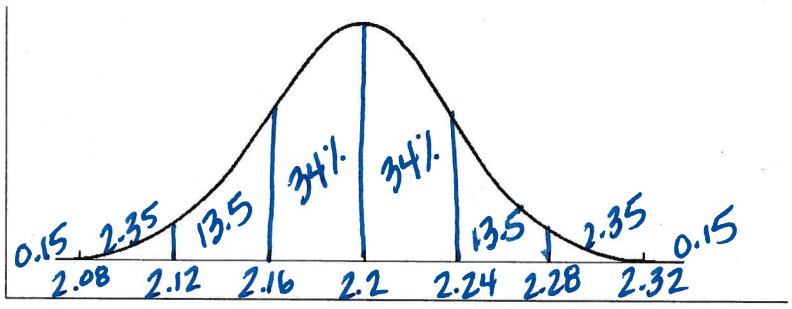
94% of 137 students.

(0.94)(137) = 128.78 students

Normal Distributions

Answer the questions using the "normalcdf" command in the calculator. Be sure to write out the calculator command used, normal curve labeled and shaded, and the final answer circled.

Suppose that the wrapper of a certain candy bar lists its weight as 2.13 ounces. Naturally, the weights of individual bars vary somewhat. Suppose that the weights of these candy bars vary according to a normal distribution with mean 2.2 ounces and standard deviation 0.04 ounces.



a. What proportions of candy bars weigh less than 2.12 ounces? **2.5%**

b. What proportion of candy bars weigh more than 2.24 ounces? **84%**

c. What proportion of candy bars weigh between 2.16 and 2.28 ounces? **81.5%**

c. What proportions of candy bars weigh less than the advertised weight?

Normalcdf (0, 2.13, 2.2, 0.04) = 0.04 = **4%**

d. What proportion of candy bars weigh more than 2.25 ounces?

Normalcdf (2.25, 999, 2.2, 0.04) = 0.1056 = **10.56%**

c. What proportion of candy bars weigh between 2.2 and 2.3 ounces?

Normalcdf (2.2, 2.3, 2.2, 0.04) = 0.4938 = **49.38%**

InvNorm

1. A university gives an admission qualifying exam. The results are normally distributed with a mean of 500 and a standard deviation of 100.

Using the chart below, find the students score that would represent the given percentile.

InvNorm: [2nd] [VARS] [3]
Inv Norm:

Percentile	Students Score
25th	432.55
50th	500
75th	567.45
90th	628.16

The admissions department would like to accept only students who score in the 65th percentile or better. Determine what score is associated with the 65th percentile and which students would qualify for admission?

InvNorm(0.65, 500, 100) = 538.53

A score above 538.53

2. The MP3 player made by Mango Corp., has an average battery of 400 hours. Battery life for the Mango Corp. MP3 player is normally distributed with a standard deviation of 25 hours.

$\bar{x} = 400$
$\sigma = 25$

- What battery life for the Mango Corp would represent the 95th percentile?

InvNorm(0.95, 400, 25) = 441.12

- What battery life for the Mango Corp is in the top 15%?

(85th percentile)

InvNorm(0.85, 400, 25) = 425.91

Fundamental Counting Principle, Permutation, and Combinations

Permutation: Order matters

Calculator Command: Math → Prb → 2

Combination: Order does NOT matter

Calculator Command: Math → Prb → 3

Show any work needed to solve each problem. Include any calculator commands used.

1. You want to create an ID code for all your customers based on three characters. The first character must be a letter of the alphabet, and the second and third must each be a digit between 1 and 9, inclusive. How many such codes are there?

$\frac{26}{\text{Let}} \cdot \frac{9}{\text{digit}} \cdot \frac{9}{\text{digit}} = 2106$

2. A license plate is to consist of two letters followed by three digits. Determine how many different license plates are possible if repetition of characters is allowed.

$26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 = 676{,}000$

C 3. A principal has decided to form a committee to determine the Tardy Policy for the upcoming school year. Forty teachers have volunteered to be on the committee. The principal would like to form a five-person committee. How many possible groups are there?

${}_{40}C_5 = 658{,}008$

P 4. How many ways can the three offices of chairman, vice chairman, and secretary be filled from a club with 25 members.

${}_{25}P_3 = 13{,}800$

5. Ryan is building his Pinewood Derby Race car. To make the car he needs to pick one body style, one color of paint, and one type of wheels. If there are 5 body styles to choose from, 10 colors of paint to choose from, and 3 types of wheels to choose from, how many possible different cars could Ryan come up with?

$5 \cdot 10 \cdot 3 = 150$

C 6. The football team needs to select 2 of its members to serve as co-captains for the team. If there are 31 members on the team, in how many possible ways can the 2 co-captains be chosen?

${}_{31}C_2 = 465$