

# 1 Pregunta 1

Sabemos que las manzanas Golden pesan en promedio 200g, y su distribución de probabilidad, sigue una distribución normal con una desviación estándar de 30g. Por otra parte, sabemos que las naranjas pesan en promedio 150 g, y su distribución de probabilidad, también sigue una distribución normal con una desviación estándar de 45 g.

## 1.1

Cree un conjunto de datos manzanas que representen 500 manzanas elegidas al azar, siguiendo la distribución mencionada.

### Solución

d = normal	d = normal
$\mu_m = 200g$	$\mu_n = 150g$
$\sigma_m = 30g$	$\sigma_n = 45g$

```
1 # 1.1
2 manzanas = rnorm(500, mean=200, sd=30)
3 manzanas
```

Figure 1: código 1.1

```
> # 1.1
> manzanas = rnorm(500, mean=200, sd=30)

> manzanas
[1] 174.8836 172.9984 175.0568 203.6419 195.2566 215.9797 209.7015 191.4338 223.1376 224.5433 236.1363 181.0857 146.1193 246.4098 195.4854 195.2029 212.1602
[18] 204.9931 220.5496 176.1816 248.6588 206.4602 121.7751 213.2124 221.9742 179.5560 219.6700 185.9189 184.6459 207.9682 265.9398 211.0086 224.8392 172.7400
[35] 244.8275 187.8515 189.8728 201.9572 208.3707 254.6883 226.3627 219.0608 228.9204 174.4079 194.1889 174.7604 184.8587 218.4757 205.3854 233.8537 187.9135
[52] 221.3281 217.1129 176.2017 228.2176 221.5049 202.7666 203.4618 165.6751 182.8892 206.5251 220.4431 176.6079 220.3855 218.9284 164.0247 137.8404 187.0372
[69] 184.5774 193.0754 202.0025 169.1300 155.6355 244.4214 174.2061 194.1121 208.6144 132.3924 192.7130 229.1845 209.0172 257.5415 181.8263 197.3086 165.4621
[86] 228.5778 230.8408 218.6070 171.1667 281.0329 188.6708 180.4126 173.0869 201.4729 181.2944 157.4322 237.6664 201.9363 190.0041 219.5680 202.6941 174.0435
[103] 218.4749 172.3515 176.8866 237.3815 203.7100 200.5649 221.8546 234.3545 170.6591 221.1320 196.5542 187.9961 214.1050 152.6981 205.2946 236.4184 135.7800
[120] 240.6098 170.5092 156.0041 204.1817 175.2048 152.2522 137.4260 172.7866 210.6956 184.3532 205.8757 181.5439 185.6274 176.1925 143.0922 188.7014 181.2189
[137] 230.9039 200.8622 177.8936 155.7721 193.1093 185.1386 190.1831 235.0771 222.7103 198.2785 229.1717 255.9223 177.5567 223.5487 210.9138 242.6899 213.9620
[154] 221.2014 209.5382 178.2613 150.6312 182.4898 186.6615 211.3083 212.3697 227.9847 160.1017 145.6762 189.5488 191.5178 187.5706 141.6050 175.6923 208.6089
[171] 191.6158 278.7651 184.4866 139.0969 165.4752 172.3606 246.2186 223.7830 194.8168 251.4686 246.3905 213.2527 237.3210 221.7154 150.5363 177.0742 129.9413
[188] 235.5176 152.1072 240.6132 158.4032 188.8762 155.4307 213.1946 216.4844 172.2978 234.7148 188.8613 181.0742 174.5706 178.5503 223.7387 162.1143 191.1026
[205] 193.8025 149.5037 142.5250 192.9385 179.8231 207.9669 195.4679 202.3641 211.3723 199.5217 213.5808 200.5132 189.4271 125.1179 145.3620 203.2625 154.5274
[222] 180.6414 173.5803 169.8698 188.0653 181.1222 211.3102 178.8847 238.8503 219.0349 229.4593 190.8916 222.2262 223.7974 206.4249 236.6153 238.1105 242.6133
[239] 159.3098 214.9810 235.7123 247.0171 216.7409 227.5113 215.1580 235.4617 198.0165 211.9691 248.1108 152.1987 206.5409 210.5806 246.4993 195.2767 222.7698
[256] 158.3990 204.7180 229.8945 232.8284 169.7941 137.1222 243.7761 219.9646 169.2130 208.2109 234.9650 237.3518 213.2236 167.7948 158.4489 253.5203 169.4810
[273] 185.7930 215.3276 200.1000 207.4348 206.9304 199.2103 177.4159 209.8641 197.8560 254.6408 166.8277 159.8063 199.5489 171.8937 156.9742 188.7793 202.6490
[290] 211.9419 169.5668 252.6569 205.6599 248.3000 243.8890 155.6031 184.5753 248.4958 222.4470 205.1894 237.5932 225.7303 205.5703 171.5535 207.7812 186.7472
[307] 241.9563 164.4292 252.7167 243.4613 174.6954 207.7512 259.3547 194.1603 168.6254 175.5797 189.7046 218.6171 216.0255 182.2095 212.0429 236.4628 182.9582
[324] 195.7297 189.3047 266.6549 168.7104 211.1302 187.3106 202.6512 182.8654 217.1729 278.7369 193.5446 196.7592 135.9699 204.3380 178.6754 242.9355 222.0882
[341] 210.2467 188.7011 204.4314 195.6141 229.4713 180.7246 231.3287 211.9313 136.8021 166.6769 201.1030 228.6459 169.3556 250.3387 225.9046 168.1983 196.8448
[358] 202.3897 202.3159 209.7672 241.8087 209.3641 190.4815 227.1784 196.2901 206.2038 189.3928 217.0382 137.0692 189.7654 245.3882 274.3892 194.2235 205.6271
[375] 215.6811 128.1829 207.6698 218.7360 179.6355 233.5375 193.1093 230.6679 207.7090 172.3089 204.5410 236.0566 177.3426 198.5077 194.5141 196.1797 221.6384
[392] 195.1231 159.6573 195.1330 189.3913 235.0868 178.3962 215.3831 198.9513 179.5064 175.7657 212.3538 217.9855 190.5417 164.0026 227.2835 183.9804 174.6334
[409] 183.8533 196.6686 167.6506 175.5368 214.0564 288.9184 167.9370 144.8668 203.4676 243.5588 206.9746 192.9659 214.4638 157.0422 168.6800 135.4616 225.2277
[426] 217.2681 195.6895 221.9389 161.1277 240.9980 188.1365 185.5413 222.0378 242.2671 232.2068 202.1921 195.0885 193.1718 204.9335 194.4618 176.8780 188.5150
[443] 201.8000 188.7505 234.2830 169.6140 239.9550 175.4579 163.2560 179.8077 185.3997 214.4825 162.4958 187.7387 219.6555 164.9985 236.6509 237.5489 183.9859
[460] 195.1606 155.1707 274.5897 229.6307 198.0228 230.1486 210.2090 148.5444 185.6821 192.9357 187.7816 176.6551 161.6020 179.2646 189.0764 209.1842 178.1474
[477] 217.5238 215.5132 220.5335 203.0076 276.8573 165.9960 213.0695 145.1676 195.8081 235.9107 168.6379 154.1538 187.8071 154.3968 178.7722 182.6898 273.3659
[494] 213.3764 178.7365 208.8919 185.9016 194.5608 159.8050 246.6932
```

Figure 2: resultados 1.1

## 1.2

Seleccione todas las manzanas que pesen entre 170 y 230 g. Calcule el porcentaje del total que representan las manzanas seleccionadas.

```
# 1.2
sel1 = manzanas[manzanas>=170]
sel2 = sel1[sel1 <= 230]
sel2
perc = length(sel2)/length(manzanas)*100
perc
```

Figure 3: código 1.2

```
> # 1.2
> sel1 = manzanas[manzanas>=170]
> sel2 = sel1[sel1 <= 230]
> sel2
[1] 174.8836 172.9984 175.0568 203.6419 195.2566 215.9797 209.7015 191.4338 223.1376 224.5433 181.0857 195.4854 195.2029 212.1602 204.9931 220.5496 176.1816
[18] 206.4602 213.2124 221.9742 179.5560 219.6700 185.9189 184.6459 207.9682 211.0086 224.8392 172.7400 187.8515 189.8728 201.9572 208.3707 226.3627 219.0608
[35] 228.9204 174.4079 194.1889 174.7604 184.8587 218.4757 205.3854 187.9135 221.3281 217.1129 176.2017 228.2176 221.5049 202.7666 203.4618 182.8892 206.5251
[52] 220.4431 176.6079 220.3855 218.9284 187.0372 184.5774 193.0754 202.0025 174.2061 194.1121 208.6144 192.7130 229.1845 209.0172 181.8263 197.3086 228.5178
[69] 218.6070 171.1667 188.6708 180.4126 173.0869 201.4729 181.2944 201.9363 190.0041 219.5680 202.6941 174.0435 218.4749 172.3515 176.8866 203.7100 200.5649
[86] 221.8546 170.6591 221.1320 196.5542 187.9961 214.1050 205.2946 170.5092 204.1817 175.2048 172.7866 210.6956 184.3532 205.8757 181.5439 185.6274 176.1925
[103] 188.7014 181.2189 200.8622 177.8936 193.1093 185.1386 190.1831 222.7103 198.2785 229.1717 177.5567 223.5487 210.9138 213.9620 221.2014 209.5382 178.2613
[120] 182.4898 186.6615 211.3083 212.3697 227.9847 189.5488 191.5178 187.5706 175.6923 208.6089 191.6158 184.4866 172.3606 223.7830 194.8168 213.2527 221.7154
[137] 177.0742 188.8762 213.1946 216.4844 172.2978 188.8613 181.0742 174.5706 178.5503 223.7387 191.1026 193.8025 192.9385 179.8231 207.9669 195.4679 202.3641
[154] 211.3723 199.5217 213.5808 200.5132 189.4271 203.2625 180.6414 173.5803 188.0653 181.1222 211.3102 178.8847 219.0349 229.4593 190.8916 222.2262 223.7974
[171] 206.4249 214.9810 216.7409 227.5113 215.1580 198.0165 211.9691 206.5409 210.5806 195.2767 222.7698 204.7180 229.8945 219.9646 208.2109 213.2236 185.7930
[188] 215.3276 200.1000 207.4348 206.9304 199.2103 177.4159 209.8641 197.8560 199.5489 171.8937 188.7793 202.6490 211.9419 205.6599 184.5753 222.4470 205.1894
[205] 225.7303 205.5703 171.5535 207.7812 186.7472 174.6954 207.7512 194.1603 175.5797 189.7046 218.6171 216.0255 182.2095 212.0429 182.9582 195.7297 189.3047
[222] 211.1302 187.3106 202.6512 182.8654 217.1729 193.5446 196.7592 204.3380 178.6754 222.0882 210.2467 188.7011 204.4314 195.6141 229.4713 180.7246 211.9313
[239] 201.1030 228.6459 225.9046 196.8448 202.3897 202.3159 209.7672 209.3641 190.4815 227.1784 196.2901 206.2038 189.3928 217.0382 189.7654 194.2235 205.6271
[256] 215.6811 207.6698 218.7360 179.6355 193.1093 207.7090 172.3089 204.5410 177.3426 198.5077 194.5141 196.1797 221.6384 195.1231 195.1330 189.3913 178.3962
[273] 215.3831 198.9513 179.5064 175.7657 212.3538 217.9855 190.5417 227.2835 183.9804 174.6334 183.8533 196.6686 175.5368 214.0564 203.4676 206.9746 192.9659
[290] 214.4638 225.2277 217.2681 195.6895 221.9389 188.1365 185.5413 222.0378 202.1921 195.0885 193.1718 204.9335 194.4618 176.8780 188.5150 201.8000 188.7505
[307] 175.4579 179.8077 185.3997 214.4825 187.7387 219.6555 183.9859 195.1606 229.6307 198.0228 210.2090 185.6821 192.9357 187.7816 176.6551 179.2646 189.0764
[324] 209.1842 178.1474 217.5238 215.5132 220.5335 203.0076 213.0695 195.8081 187.8071 178.7722 182.6898 213.3764 178.7365 208.8919 185.9016 194.5608
> perc = length(sel2)/length(manzanas)*100
> perc
[1] 67.8
```

Figure 4: resultados 1.2

## Solución

Al observar que la media es 200 y la desviación estándar es 30, si seleccionamos todos aquellos datos entre 170 y 230 y calculamos el porcentaje del total que estos datos representan, obtenemos que son el 67.8% de los datos, lo cual concuerda con la regla de 68-95-99.7 para la distribución normal, que determina que alrededor del 68% de los datos se encuentra a una distancia de una desviación estándar de la media, es decir, el 68% de los datos toman un valor de entre  $200 - 30 = 170$  y  $200 + 30 = 230$ .

## 1.3

Cree un conjunto de datos naranjas que representen 300 naranjas elegidas al azar, siguiendo la distribución mencionada.

## Solución

```
# 1.3
naranjas = rnorm(300, mean=150, sd=45)
naranjas
```

Figure 5: código 1.3

```
> # 1.3
> naranjas = rnorm(300, mean=150, sd=45)

> naranjas
[1] 96.29299 173.14325 104.48222 180.73075 181.69314 136.17887 254.25243 162.31429 204.10757 128.01270 186.65438 92.04441 170.20140 272.50163 137.80546
[16] 71.69873 121.66176 171.92690 243.36095 129.03753 93.47305 176.18896 148.42067 130.54760 202.47953 202.16575 159.04592 129.16512 109.21454 171.89431
[31] 186.71591 206.35052 186.62896 151.47997 167.10263 107.74300 163.18582 190.02259 128.24027 130.30342 94.14347 140.86135 167.11787 158.80652 131.94756
[46] 237.39556 268.00015 161.39115 97.12819 101.71370 109.57795 117.26595 141.52915 200.50840 143.81840 128.55750 151.88381 73.43823 222.56838 250.91000
[61] 176.06928 138.01760 103.04896 177.16468 173.73515 219.26968 209.07935 136.94161 212.80140 192.93291 174.43575 178.13237 142.57511 172.19171 200.98384
[76] 162.60591 204.92105 127.61349 178.11532 121.40124 217.99754 209.89290 138.36861 58.97680 169.06422 102.63159 161.78073 129.64446 139.48139 198.99562
[91] 161.02110 131.18930 96.52961 209.76955 127.93138 138.68737 134.57423 168.01085 106.22379 162.01247 168.12778 166.21208 238.43684 165.53099 140.00379
[106] 117.64821 183.29756 239.67502 149.68245 133.63115 211.30410 209.78953 160.28304 96.10900 131.31101 183.33072 161.62149 137.77279 143.07639 126.55382
[121] 100.75825 107.00262 201.07616 91.34001 113.83076 172.26076 116.34539 217.91703 179.23686 253.21745 188.61260 155.77497 131.19969 90.05141 126.26097
[136] 110.61683 133.76531 167.91110 163.85644 164.85464 136.61167 113.51902 183.68696 114.91874 158.96385 149.28739 167.82980 74.14752 185.08309 206.98982
[151] 174.14983 152.37623 114.11935 94.90718 123.78447 145.27439 86.66261 147.62858 145.25063 90.24914 147.49116 186.88028 189.24713 198.97548 109.45231
[166] 242.45049 109.74998 249.06188 180.14919 205.63013 201.00552 152.75268 165.94263 123.82371 176.90373 171.99403 231.33499 107.74331 197.11424 181.33925
[181] 143.09382 153.86120 119.00145 166.43152 69.10945 113.88470 242.36974 201.52870 159.57025 107.90997 154.70517 246.50895 150.67330 147.49100 185.36760
[196] 190.71265 223.86067 180.08524 146.06903 207.65239 90.19994 165.55575 130.91706 186.28363 232.68075 182.70405 111.20098 136.50555 149.24799 190.17590
[211] 147.21789 145.50255 138.38922 175.79062 209.08474 157.22605 187.81940 100.78881 216.12424 134.71068 185.01615 156.23849 131.54178 209.21413 148.58772
[226] 140.04106 188.73344 99.25730 196.40393 150.75346 171.64025 99.82114 132.99267 85.18921 89.77789 105.54697 99.18784 86.11813 76.00909 164.36597
[241] 129.02241 27.90435 145.12328 218.81886 119.57032 216.24463 140.70024 152.34274 233.15212 143.76608 156.95874 153.01751 213.27951 127.72380 189.09336
[256] 107.55236 113.44236 135.13886 155.29175 103.80847 163.52209 214.22438 148.17045 104.48695 130.66306 162.19916 156.76705 194.83125 171.09952 142.65256
[271] 132.91666 139.62270 127.74994 147.69440 177.34103 158.09034 156.46261 158.85366 72.80597 130.09043 194.17716 135.28865 95.51102 159.84393 134.81022
[286] 206.09159 101.28446 144.05649 111.43268 85.72312 169.13391 187.22956 166.55857 122.51733 114.99525 117.93925 266.17904 215.46135 138.12781 105.81658
```

Figure 6: resultados 1.3

## 1.4

Seleccione todas las naranjas que pesen entre 105 y 195 g. Calcule el porcentaje que representan las manzanas seleccionadas.

### Solución

```
# 1.4
sel3 = naranjas[naranjas>=105]
sel4 = sel3[sel3 <= 195]
perc2 = length(sel4)/length(naranjas)*100
perc2
```

Figure 7: código 1.4

```
> # 1.4
> sel3 = naranjas[naranjas>=105]
> sel4 = sel3[sel3 <= 195]
> sel4
[1] 173.1432 180.7307 181.6931 136.1789 162.3143 128.0127 186.6544 170.2014 137.8055 121.6618 171.9269 129.0375 176.1890 148.4207 130.5476 159.0459 129.1651
[18] 109.2145 171.8943 186.7159 186.6290 151.4800 167.1026 107.7430 163.1858 190.0226 128.2403 130.3034 140.8614 167.1179 158.8065 131.9476 161.3912 109.5780
[35] 117.2659 141.5292 143.8184 128.5575 151.8838 176.0693 138.0176 177.1647 173.7351 136.9416 192.9329 174.4357 178.1324 142.5751 172.1917 162.6059 127.6135
[52] 178.1153 121.4012 138.3686 169.0642 161.7807 129.6445 139.4814 161.0211 131.1893 127.9314 138.6874 134.5742 168.0109 106.2238 162.0125 168.1278 166.2121
[69] 165.5310 140.0038 117.6482 183.2976 149.6824 133.6311 160.2830 131.3110 183.3307 161.6215 137.7728 143.0764 126.5538 107.0026 113.8308 172.2608 116.3454
[86] 179.2369 188.6126 155.7750 131.1997 126.2610 110.6168 133.7653 167.9111 163.8564 164.8546 136.6117 113.5190 183.6870 114.9187 158.9639 149.2874 167.8298
[103] 185.0831 174.1498 152.3762 114.1193 123.7845 145.2744 147.6286 145.2506 147.4912 186.8803 189.2471 109.4523 109.7500 180.1492 152.7527 165.9426 123.8237
[120] 176.9037 171.9940 107.7433 181.3392 143.0938 153.8612 119.0014 166.4315 113.8847 159.5702 107.9100 154.7052 150.6733 147.4910 185.3676 190.7127 180.0852
[137] 146.0690 165.5557 130.9171 186.2836 182.7040 111.2010 136.5055 149.2480 190.1759 147.2179 145.5026 138.3892 175.7906 157.2260 187.8194 134.7107 185.0162
[154] 156.2385 131.5418 148.5877 140.0411 188.7334 150.7535 171.6402 132.9927 105.5470 164.3660 129.0224 145.1233 119.5703 140.7002 152.3427 143.7661 156.9587
[171] 153.0175 127.7238 189.0934 107.5524 113.4424 135.1389 155.2917 163.5221 148.1705 130.6631 162.1992 156.7670 194.8312 171.0995 142.6526 132.9167 139.6227
[188] 127.7499 147.6944 177.3410 158.0903 156.4626 158.8537 130.0904 194.1772 135.2887 159.8439 134.8102 144.0565 111.4327 169.1339 187.2296 166.5586 122.5173
[205] 114.9952 117.9392 138.1278 105.8166

> perc2 = length(sel4)/length(naranjas)*100
> perc2
[1] 69.33333
```

Figure 8: resultados 1.4

Dado que los datos de naranjas tienen una distribución normal, y que sabemos que su media es 150 y su desviación estándar es 45, sabemos que la distribución está centrada alrededor de 150 (media). Esto significa que la mayoría de los datos tienen una medida parecida a la media, y más específicamente, siguiendo la regla de 68-95-99.7 para la distribución normal, sabemos que el 68% de los datos de naranjas tendrá un valor de entre  $150 - 45 = 105$  y  $150 + 45 = 195$ , ya que esta propiedad estipula que el 68% de los datos se encuentra a una distancia de  $\mu - \sigma$  y  $\mu + \sigma$  o una desviación estándar hacia ambos

lados de la media. Como resultado, se observa que en este data set, el 69.33% de los datos se encuentra entre 105 y 195, como estipula la regla de 68-95-99.7 para la distribución normal.