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Registration Number: 21112016

Class: 2BSc DS A R for Analytics CAC - 1

1. From the package "datasets" use the dataset called EuStockMarkets and assign to a variable "eustock". –Contains the daily closing prices of major European stock indices: Germany DAX (Ibis), Switzerland SMI, France CAC, and UK FTSE. The data are sampled in business time, i.e., weekends and holidays are omitted. # We assign the dataset to a variable called "eustock" by simply using an assignment operator and recall the variable

```
eustock <- EuStockMarkets
eustock</pre>
```

```
## Time Series:
## Start = c(1991, 130)
## End = c(1998, 169)
## Frequency = 260
                DAX
                       SMI
                              CAC
                                    FTSE
## 1991.496 1628.75 1678.1 1772.8 2443.6
## 1991.500 1613.63 1688.5 1750.5 2460.2
## 1991.504 1606.51 1678.6 1718.0 2448.2
## 1991.508 1621.04 1684.1 1708.1 2470.4
## 1991.512 1618.16 1686.6 1723.1 2484.7
## 1991.515 1610.61 1671.6 1714.3 2466.8
## 1991.519 1630.75 1682.9 1734.5 2487.9
## 1991.523 1640.17 1703.6 1757.4 2508.4
## 1991.527 1635.47 1697.5 1754.0 2510.5
## 1991.531 1645.89 1716.3 1754.3 2497.4
## 1991.535 1647.84 1723.8 1759.8 2532.5
## 1991.538 1638.35 1730.5 1755.5 2556.8
## 1991.542 1629.93 1727.4 1758.1 2561.0
## 1991.546 1621.49 1733.3 1757.5 2547.3
## 1991.550 1624.74 1734.0 1763.5 2541.5
## 1991.554 1627.63 1728.3 1762.8 2558.5
## 1991.558 1631.99 1737.1 1768.9 2587.9
## 1991.562 1621.18 1723.1 1778.1 2580.5
## 1991.565 1613.42 1723.6 1780.1 2579.6
## 1991.569 1604.95 1719.0 1767.7 2589.3
## 1991.573 1605.75 1721.2 1757.9 2595.0
## 1991.577 1616.67 1725.3 1756.6 2595.6
## 1991.581 1619.29 1727.2 1754.7 2588.8
## 1991.585 1620.49 1727.2 1766.8 2591.7
## 1991.588 1619.67 1731.6 1766.5 2601.7
## 1991.592 1623.07 1724.1 1762.2 2585.4
## 1991.596 1613.98 1716.9 1759.5 2573.3
## 1991.600 1631.87 1723.4 1782.4 2597.4
## 1991.604 1630.37 1723.0 1789.5 2600.6
## 1991.608 1633.47 1728.4 1783.5 2570.6
## 1991.612 1626.55 1722.1 1780.4 2569.4
## 1991.615 1650.43 1724.5 1808.8 2584.9
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## 1991.619 1650.06 1733.6 1820.3 2608.8
## 1991.623 1654.11 1739.0 1820.3 2617.2
## 1991.627 1653.60 1726.2 1820.3 2621.0
## 1991.631 1501.82 1587.4 1687.5 2540.5
## 1991.635 1524.28 1630.6 1725.6 2554.5
## 1991.638 1603.65 1685.5 1792.9 2601.9
## 1991.642 1622.49 1701.3 1819.1 2623.0
## 1991.646 1636.68 1718.0 1833.5 2640.7
## 1991.650 1652.10 1726.2 1853.4 2640.7
## 1991.654 1645.81 1716.6 1849.7 2619.8
## 1991.658 1650.36 1725.8 1851.8 2624.2
## 1991.662 1651.55 1737.4 1857.7 2638.2
## 1991.665 1649.88 1736.6 1864.3 2645.7
## 1991.669 1653.52 1732.4 1863.5 2679.6
## 1991.673 1657.51 1731.2 1873.2 2669.0
## 1991.677 1649.55 1726.9 1860.8 2664.6
## 1991.681 1649.09 1727.8 1868.7 2663.3
## 1991.685 1646.41 1720.2 1860.4 2667.4
## 1991.688 1638.65 1715.4 1855.9 2653.2
## 1991.692 1625.80 1708.7 1840.5 2630.8
## 1991.696 1628.64 1713.0 1842.6 2626.6
## 1991.700 1632.22 1713.5 1861.2 2641.9
## 1991.704 1633.65 1718.0 1876.2 2625.8
## 1991.708 1631.17 1701.7 1878.3 2606.0
## 1991.712 1635.80 1701.7 1878.4 2594.4
## 1991.715 1621.27 1684.9 1869.4 2583.6
## 1991.719 1624.70 1687.2 1880.4 2588.7
## 1991.723 1616.13 1690.6 1885.5 2600.3
## 1991.727 1618.12 1684.3 1888.4 2579.5
## 1991.731 1627.80 1679.9 1885.2 2576.6
## 1991.735 1625.79 1672.9 1877.9 2597.8
## 1991.738 1614.80 1663.1 1876.5 2595.6
## 1991.742 1612.80 1669.3 1883.8 2599.0
## 1991.746 1605.47 1664.7 1880.6 2621.7
## 1991.750 1609.32 1672.3 1887.4 2645.6
## 1991.754 1607.48 1687.7 1878.3 2644.2
## 1991.758 1607.48 1686.8 1867.1 2625.6
## 1991.762 1604.89 1686.6 1851.9 2624.6
## 1991.765 1589.12 1675.8 1843.6 2596.2
## 1991.769 1582.27 1677.4 1848.1 2599.5
## 1991.773 1567.99 1673.2 1843.4 2584.1
## 1991.777 1568.16 1665.0 1843.6 2570.8
## 1991.781 1569.71 1671.3 1833.8 2555.0
## 1991.785 1571.74 1672.4 1833.4 2574.5
## 1991.788 1585.41 1676.2 1856.9 2576.7
## 1991.792 1570.01 1692.6 1863.4 2579.0
## 1991.796 1561.89 1696.5 1855.5 2588.7
## 1991.800 1565.18 1716.1 1864.2 2601.1
## 1991.804 1570.34 1713.3 1846.0 2575.7
## 1991.808 1577.00 1705.1 1836.8 2559.5
## 1991.812 1590.29 1711.3 1830.4 2561.1
## 1991.815 1572.72 1709.8 1831.6 2528.3
## 1991.819 1572.07 1688.6 1834.8 2514.7
## 1991.823 1579.19 1698.9 1852.1 2558.5
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## 1991.827 1588.73 1700.0 1849.8 2553.3
## 1991.831 1586.01 1693.0 1861.8 2577.1
## 1991.835 1579.77 1683.9 1856.7 2566.0
## 1991.838 1572.58 1679.2 1856.7 2549.5
## 1991.842 1568.09 1673.9 1841.5 2527.8
## 1991.846 1578.21 1683.9 1846.9 2540.9
## 1991.850 1573.94 1688.4 1836.1 2534.2
## 1991.854 1582.06 1693.9 1838.6 2538.0
## 1991.858 1610.18 1720.9 1857.6 2559.0
## 1991.862 1605.16 1717.9 1857.6 2554.9
## 1991.865 1623.84 1733.6 1858.4 2575.5
## 1991.869 1615.26 1729.7 1846.8 2546.5
## 1991.873 1627.08 1735.6 1868.5 2561.6
## 1991.877 1626.97 1734.1 1863.2 2546.6
## 1991.881 1605.70 1699.3 1808.3 2502.9
## 1991.885 1589.70 1678.6 1765.1 2463.1
## 1991.888 1589.70 1675.5 1763.5 2472.6
## 1991.892 1603.26 1670.1 1766.0 2463.5
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## 1991.904 1603.50 1654.9 1769.0 2471.5
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## 1991.923 1549.36 1612.4 1722.2 2420.2
## 1991.927 1554.65 1625.0 1713.9 2423.8
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## 1992.412 1792.80 1914.2 2014.1 2694.2
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## 1992.446 1789.45 1888.0 1953.7 2636.1
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## 1992.512 1776.50 1870.5 1883.6 2497.1
## 1992.515 1769.98 1862.6 1868.5 2469.0
## 1992.519 1766.98 1856.6 1879.1 2493.7
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## 1992.565 1622.81 1762.8 1734.6 2399.5
## 1992.569 1613.36 1756.8 1734.6 2377.2
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## 1992.577 1617.18 1778.5 1769.0 2373.4
## 1992.581 1637.62 1812.7 1801.6 2423.2
## 1992.585 1622.20 1806.1 1782.6 2411.6
## 1992.588 1608.49 1798.1 1754.7 2399.6
## 1992.592 1605.11 1794.9 1784.4 2420.2
## 1992.596 1609.61 1805.4 1787.6 2407.5
## 1992.600 1624.94 1820.3 1798.0 2392.8
## 1992.604 1618.07 1819.6 1793.8 2377.6
## 1992.608 1611.96 1809.6 1777.3 2350.1
## 1992.612 1578.95 1799.9 1755.2 2325.7
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## 1992.619 1547.87 1793.3 1730.1 2303.1
## 1992.623 1548.63 1784.8 1722.4 2318.0
## 1992.627 1560.16 1791.7 1753.5 2356.8
## 1992.631 1554.76 1800.2 1757.3 2376.1
## 1992.635 1531.87 1788.6 1736.7 2354.7
## 1992.638 1526.14 1775.7 1734.2 2363.5
## 1992.642 1509.03 1753.5 1724.2 2359.4
## 1992.646 1530.03 1768.2 1744.2 2365.7
## 1992.650 1484.97 1727.9 1689.7 2311.1
## 1992.654 1464.03 1709.6 1667.7 2281.0
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## 1992.685 1534.72 1774.4 1779.0 2362.2
## 1992.688 1538.66 1788.3 1779.3 2372.2
## 1992.692 1536.71 1788.0 1763.7 2337.7
## 1992.696 1523.83 1779.1 1756.8 2327.5
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## 1992.719 1579.47 1889.6 1852.7 2483.9
## 1992.723 1600.59 1897.5 1882.9 2567.0
## 1992.727 1566.00 1888.8 1826.1 2560.1
## 1992.731 1557.01 1900.4 1832.8 2586.0
## 1992.735 1542.74 1913.4 1828.9 2580.5
## 1992.738 1536.30 1909.9 1829.5 2621.2
## 1992.742 1510.66 1910.8 1843.5 2601.0
## 1992.746 1481.03 1879.2 1770.3 2560.0
## 1992.750 1483.83 1880.2 1731.9 2565.5
## 1992.754 1470.09 1878.3 1736.7 2553.0
## 1992.758 1484.78 1885.2 1724.0 2572.3
## 1992.762 1475.41 1867.6 1683.3 2549.7
## 1992.765 1402.34 1788.0 1611.0 2446.3
## 1992.769 1421.49 1820.5 1612.5 2488.4
## 1992.773 1434.61 1858.2 1654.2 2517.1
## 1992.777 1446.32 1870.3 1673.9 2538.8
## 1992.781 1437.65 1878.4 1657.3 2541.2
## 1992.785 1441.57 1881.5 1655.1 2557.2
## 1992.788 1471.64 1893.2 1685.1 2584.7
## 1992.792 1453.95 1889.3 1667.9 2574.7
## 1992.796 1453.79 1877.3 1650.0 2546.6
## 1992.800 1458.02 1884.0 1664.2 2563.9
## 1992.804 1479.59 1904.7 1679.1 2562.2
## 1992.808 1504.89 1922.7 1731.3 2617.0
## 1992.812 1496.54 1908.5 1722.2 2645.7
## 1992.815 1511.00 1911.4 1730.7 2658.1
## 1992.819 1528.86 1921.1 1766.4 2669.7
## 1992.823 1534.02 1930.8 1770.7 2661.6
## 1992.827 1536.60 1927.8 1774.5 2669.8
## 1992.831 1508.19 1908.3 1749.9 2650.4
## 1992.835 1493.54 1905.9 1730.9 2642.3
## 1992.838 1489.68 1911.1 1742.4 2658.3
## 1992.842 1482.44 1921.6 1742.4 2687.8
## 1992.846 1483.34 1933.6 1786.9 2705.6
## 1992.850 1470.57 1942.0 1804.1 2691.7
## 1992.854 1484.84 1951.5 1804.7 2711.1
## 1992.858 1487.71 1955.7 1793.6 2702.7
## 1992.862 1508.63 1957.4 1786.7 2695.4
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## 1992.865 1515.27 1962.3 1798.5 2714.6
## 1992.869 1509.84 1946.1 1798.5 2696.8
## 1992.873 1542.28 1950.2 1821.5 2726.4
## 1992.877 1541.79 1929.7 1796.8 2697.5
## 1992.881 1542.48 1913.4 1772.7 2679.6
## 1992.885 1550.27 1889.5 1764.4 2679.2
## 1992.888 1550.27 1882.8 1759.2 2704.0
## 1992.892 1543.37 1895.4 1722.3 2706.2
## 1992.896 1547.84 1897.9 1724.2 2732.4
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## 1998.642 5355.03 7552.6 3951.7 5399.5
## 1998.646 5473.72 7676.3 3995.0 5455.0
```

2. Find the class of the data set retrieved. If it is not a data frame class convert this to a data frame. # We check the class of the variable called "eustock" and it is "mts ts matrix" # so, we convert the data frame from "mts ts matrix" to data frame using as.data.frame() # and assign it to a variable

```
class(eustock)
```

```
## [1] "mts" "ts" "matrix"
```

eustock <- as.data.frame(eustock) eustock</pre>

```
##
            DAX
                   SMI
                          CAC
                                 FTSE
## 1
        1628.75 1678.1 1772.8 2443.6
## 2
        1613.63 1688.5 1750.5 2460.2
## 3
        1606.51 1678.6 1718.0 2448.2
        1621.04 1684.1 1708.1 2470.4
## 4
## 5
        1618.16 1686.6 1723.1 2484.7
## 6
        1610.61 1671.6 1714.3 2466.8
## 7
        1630.75 1682.9 1734.5 2487.9
        1640.17 1703.6 1757.4 2508.4
## 8
## 9
        1635.47 1697.5 1754.0 2510.5
## 10
        1645.89 1716.3 1754.3 2497.4
## 11
        1647.84 1723.8 1759.8 2532.5
## 12
        1638.35 1730.5 1755.5 2556.8
## 13
        1629.93 1727.4 1758.1 2561.0
## 14
        1621.49 1733.3 1757.5 2547.3
        1624.74 1734.0 1763.5 2541.5
## 15
## 16
        1627.63 1728.3 1762.8 2558.5
        1631.99 1737.1 1768.9 2587.9
## 17
## 18
        1621.18 1723.1 1778.1 2580.5
        1613.42 1723.6 1780.1 2579.6
## 19
## 20
        1604.95 1719.0 1767.7 2589.3
## 21
        1605.75 1721.2 1757.9 2595.0
## 22
        1616.67 1725.3 1756.6 2595.6
## 23
        1619.29 1727.2 1754.7 2588.8
## 24
        1620.49 1727.2 1766.8 2591.7
## 25
        1619.67 1731.6 1766.5 2601.7
## 26
        1623.07 1724.1 1762.2 2585.4
## 27
        1613.98 1716.9 1759.5 2573.3
## 28
        1631.87 1723.4 1782.4 2597.4
## 29
        1630.37 1723.0 1789.5 2600.6
        1633.47 1728.4 1783.5 2570.6
## 30
        1626.55 1722.1 1780.4 2569.4
## 31
## 32
        1650.43 1724.5 1808.8 2584.9
## 33
        1650.06 1733.6 1820.3 2608.8
## 34
        1654.11 1739.0 1820.3 2617.2
        1653.60 1726.2 1820.3 2621.0
## 35
## 36
        1501.82 1587.4 1687.5 2540.5
## 37
        1524.28 1630.6 1725.6 2554.5
## 38
        1603.65 1685.5 1792.9 2601.9
## 39
        1622.49 1701.3 1819.1 2623.0
## 40
        1636.68 1718.0 1833.5 2640.7
## 41
        1652.10 1726.2 1853.4 2640.7
        1645.81 1716.6 1849.7 2619.8
## 42
## 43
        1650.36 1725.8 1851.8 2624.2
## 44
        1651.55 1737.4 1857.7 2638.2
        1649.88 1736.6 1864.3 2645.7
## 45
## 46
        1653.52 1732.4 1863.5 2679.6
        1657.51 1731.2 1873.2 2669.0
## 47
        1649.55 1726.9 1860.8 2664.6
## 48
        1649.09 1727.8 1868.7 2663.3
## 49
```

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## 50
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## 51
        1638.65 1715.4 1855.9 2653.2
## 52
        1625.80 1708.7 1840.5 2630.8
        1628.64 1713.0 1842.6 2626.6
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## 54
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## 55
        1633.65 1718.0 1876.2 2625.8
        1631.17 1701.7 1878.3 2606.0
## 56
        1635.80 1701.7 1878.4 2594.4
## 57
## 58
        1621.27 1684.9 1869.4 2583.6
## 59
        1624.70 1687.2 1880.4 2588.7
## 60
        1616.13 1690.6 1885.5 2600.3
## 61
        1618.12 1684.3 1888.4 2579.5
## 62
        1627.80 1679.9 1885.2 2576.6
        1625.79 1672.9 1877.9 2597.8
## 63
## 64
        1614.80 1663.1 1876.5 2595.6
## 65
        1612.80 1669.3 1883.8 2599.0
## 66
        1605.47 1664.7 1880.6 2621.7
## 67
        1609.32 1672.3 1887.4 2645.6
## 68
        1607.48 1687.7 1878.3 2644.2
## 69
        1607.48 1686.8 1867.1 2625.6
## 70
        1604.89 1686.6 1851.9 2624.6
## 71
        1589.12 1675.8 1843.6 2596.2
        1582.27 1677.4 1848.1 2599.5
## 72
## 73
        1567.99 1673.2 1843.4 2584.1
## 74
        1568.16 1665.0 1843.6 2570.8
## 75
        1569.71 1671.3 1833.8 2555.0
## 76
        1571.74 1672.4 1833.4 2574.5
        1585.41 1676.2 1856.9 2576.7
## 77
## 78
        1570.01 1692.6 1863.4 2579.0
## 79
        1561.89 1696.5 1855.5 2588.7
## 80
        1565.18 1716.1 1864.2 2601.1
## 81
        1570.34 1713.3 1846.0 2575.7
## 82
        1577.00 1705.1 1836.8 2559.5
## 83
        1590.29 1711.3 1830.4 2561.1
## 84
        1572.72 1709.8 1831.6 2528.3
## 85
        1572.07 1688.6 1834.8 2514.7
## 86
        1579.19 1698.9 1852.1 2558.5
## 87
        1588.73 1700.0 1849.8 2553.3
## 88
        1586.01 1693.0 1861.8 2577.1
## 89
        1579.77 1683.9 1856.7 2566.0
## 90
        1572.58 1679.2 1856.7 2549.5
## 91
        1568.09 1673.9 1841.5 2527.8
## 92
        1578.21 1683.9 1846.9 2540.9
## 93
        1573.94 1688.4 1836.1 2534.2
        1582.06 1693.9 1838.6 2538.0
## 94
## 95
        1610.18 1720.9 1857.6 2559.0
## 96
        1605.16 1717.9 1857.6 2554.9
## 97
        1623.84 1733.6 1858.4 2575.5
## 98
        1615.26 1729.7 1846.8 2546.5
## 99
        1627.08 1735.6 1868.5 2561.6
## 100
        1626.97 1734.1 1863.2 2546.6
## 101
        1605.70 1699.3 1808.3 2502.9
## 102
        1589.70 1678.6 1765.1 2463.1
## 103
       1589.70 1675.5 1763.5 2472.6
```

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## 104
       1603.26 1670.1 1766.0 2463.5
## 105
       1599.75 1652.2 1741.3 2446.3
## 106
       1590.86 1635.0 1743.3 2456.2
## 107
        1603.50 1654.9 1769.0 2471.5
## 108
        1589.86 1642.0 1757.9 2447.5
## 109
       1587.92 1638.7 1754.9 2428.6
       1571.06 1622.6 1739.7 2420.2
## 110
## 111
       1549.81 1596.1 1708.8 2414.9
## 112
       1549.36 1612.4 1722.2 2420.2
## 113
       1554.65 1625.0 1713.9 2423.8
## 114
       1557.52 1610.5 1703.2 2407.0
       1555.31 1606.6 1685.7 2388.7
## 115
## 116
       1559.76 1610.7 1663.4 2409.6
## 117
        1548.44 1603.1 1636.9 2392.0
## 118
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## 119
        1550.21 1605.2 1671.6 2423.3
## 120
        1557.03 1621.4 1688.3 2451.6
## 121
        1551.78 1622.5 1696.8 2440.8
## 122
       1562.89 1626.6 1711.7 2432.9
## 123
        1570.28 1627.4 1706.2 2413.6
## 124
       1559.26 1614.9 1684.2 2391.6
## 125
       1545.87 1602.3 1648.5 2358.1
       1542.77 1598.3 1633.6 2345.4
## 126
       1542.77 1627.0 1699.1 2384.4
## 127
## 128
       1542.77 1627.0 1699.1 2384.4
## 129
       1542.77 1627.0 1722.5 2384.4
## 130
       1564.27 1655.7 1720.7 2418.7
## 131
       1577.26 1670.1 1741.9 2420.0
## 132
       1577.26 1670.1 1765.7 2493.1
## 133
       1577.26 1670.1 1765.7 2493.1
## 134
        1598.19 1670.1 1749.9 2492.8
## 135
        1604.05 1704.0 1770.3 2504.1
## 136
        1604.69 1711.8 1787.6 2493.2
        1593.65 1700.5 1778.7 2482.9
## 137
## 138
        1581.68 1690.3 1785.6 2467.1
## 139
        1599.14 1715.4 1833.9 2497.9
## 140
       1613.82 1723.5 1837.4 2477.9
## 141
       1620.45 1719.4 1824.3 2490.1
## 142
       1629.51 1734.4 1843.8 2516.3
       1663.70 1772.8 1873.6 2537.1
## 143
## 144
       1664.09 1760.3 1860.2 2541.6
## 145
       1669.29 1747.2 1860.2 2536.7
## 146
       1685.14 1750.2 1865.9 2544.9
## 147
        1687.07 1755.3 1867.9 2543.4
## 148
       1680.13 1754.6 1841.3 2522.0
        1671.84 1751.2 1838.7 2525.3
## 149
## 150
        1669.52 1752.5 1849.9 2510.4
## 151
        1686.71 1769.4 1869.3 2539.9
## 152
       1685.51 1767.6 1890.6 2552.0
## 153
        1671.01 1750.0 1879.6 2546.5
## 154
        1683.06 1747.1 1873.9 2550.8
## 155
       1685.70 1753.5 1875.3 2571.2
## 156
       1685.66 1752.8 1857.0 2560.2
## 157
       1678.77 1752.9 1856.5 2556.8
```

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## 158
        1685.85 1764.7 1865.8 2547.1
## 159
        1683.71 1776.8 1860.6 2534.3
        1686.59 1779.3 1861.6 2517.2
## 160
## 161
        1683.73 1785.1 1865.6 2538.4
## 162
        1679.14 1798.2 1864.1 2537.1
        1685.03 1794.1 1861.6 2523.7
## 163
        1680.81 1795.2 1876.5 2522.6
## 164
        1676.17 1780.4 1865.1 2513.9
## 165
## 166
        1688.46 1789.5 1882.1 2541.0
## 167
        1696.55 1794.2 1912.2 2555.9
## 168
        1690.24 1784.4 1915.4 2536.7
        1711.35 1800.1 1951.2 2543.4
## 169
## 170
        1711.29 1804.0 1962.4 2542.3
## 171
        1729.86 1816.2 1976.5 2559.7
## 172
        1716.63 1810.5 1953.5 2546.8
## 173
        1743.36 1821.9 1981.3 2565.0
## 174
        1745.17 1828.2 1985.1 2562.0
## 175
        1746.76 1840.6 1983.4 2562.1
        1749.29 1841.1 1979.7 2554.3
## 176
## 177
        1763.86 1846.3 1983.8 2565.4
## 178
        1762.27 1850.0 1988.1 2558.4
        1762.29 1839.0 1973.0 2538.3
## 179
        1746.77 1820.2 1966.9 2533.1
## 180
        1753.50 1815.2 1976.3 2550.7
## 181
## 182
        1753.21 1820.6 1993.9 2574.8
## 183
        1739.88 1807.1 1968.0 2522.4
        1723.92 1791.4 1941.8 2493.3
## 184
## 185
        1734.42 1806.2 1947.1 2476.0
## 186
        1723.13 1798.7 1929.2 2470.7
## 187
        1732.92 1818.2 1943.6 2491.2
## 188
        1729.89 1820.5 1928.2 2464.7
## 189
        1725.74 1833.3 1922.0 2467.6
## 190
        1730.90 1837.1 1919.1 2456.6
        1714.17 1818.2 1884.6 2441.0
## 191
## 192
        1716.20 1824.1 1896.3 2458.7
## 193
        1719.06 1830.1 1928.3 2464.9
## 194
        1718.21 1835.6 1934.8 2472.2
## 195
        1698.84 1828.7 1923.5 2447.9
        1714.76 1839.2 1943.8 2452.9
## 196
## 197
        1718.35 1837.2 1942.4 2440.1
        1706.69 1826.7 1928.1 2408.6
## 198
## 199
        1723.37 1838.0 1942.0 2405.4
## 200
        1716.18 1829.1 1942.7 2382.7
## 201
        1738.78 1843.1 1974.8 2400.9
        1737.41 1850.5 1975.4 2404.2
## 202
        1714.77 1827.1 1907.5 2393.2
## 203
## 204
        1724.24 1829.1 1943.6 2436.4
## 205
        1733.77 1848.0 1974.1 2572.6
## 206
        1729.96 1840.5 1963.3 2591.0
## 207
        1734.46 1853.8 1972.3 2600.5
## 208
        1744.35 1874.1 1990.7 2640.2
## 209
        1746.88 1871.3 1978.2 2638.6
## 210 1746.88 1871.3 1978.2 2638.6
## 211 1746.88 1871.3 1978.2 2638.6
```

```
## 212 1747.47 1860.5 1980.4 2625.8
## 213
        1753.10 1874.7 1983.7 2607.8
        1745.17 1880.1 1978.1 2609.8
## 214
## 215
        1745.72 1874.7 1984.9 2643.0
## 216
        1742.92 1875.6 1995.7 2658.2
## 217
        1731.68 1859.5 2006.6 2651.0
        1731.18 1874.2 2036.7 2664.9
## 218
## 219
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## 220
        1728.09 1880.1 2031.1 2659.8
## 221
        1731.29 1907.7 2041.6 2659.8
## 222
        1733.82 1920.5 2046.9 2662.2
        1745.78 1937.3 2047.2 2698.7
## 223
## 224
        1752.57 1936.8 2063.4 2701.9
## 225
        1748.13 1949.1 2063.4 2725.7
## 226
        1750.70 1963.7 2077.5 2737.8
## 227
        1747.91 1950.8 2063.6 2722.4
## 228
        1745.79 1953.5 2053.2 2720.5
## 229
        1735.34 1945.0 2017.0 2694.7
## 230
        1719.92 1921.1 2024.0 2682.6
## 231
        1763.59 1939.1 2051.6 2703.6
        1766.76 1928.0 2023.1 2700.6
## 232
## 233
        1785.40 1933.4 2030.8 2711.9
        1783.56 1925.7 2016.8 2702.0
## 234
        1804.42 1931.7 2045.1 2715.0
## 235
## 236
        1812.33 1928.7 2046.3 2715.0
## 237
        1799.51 1924.5 2029.6 2704.6
## 238
        1792.80 1914.2 2014.1 2698.6
        1792.80 1914.2 2014.1 2694.2
## 239
## 240
        1806.36 1920.6 2033.3 2707.6
## 241
        1798.23 1923.3 2017.4 2697.6
## 242
        1800.62 1930.4 2024.9 2705.9
## 243
        1786.19 1915.2 1992.6 2680.9
## 244
        1791.35 1916.9 1994.9 2681.9
        1789.05 1913.8 1981.6 2668.5
## 245
## 246
        1789.05 1913.8 1981.6 2645.8
## 247
        1784.71 1899.7 1962.2 2635.4
## 248
        1789.45 1888.0 1953.7 2636.1
## 249
        1779.74 1868.8 1928.8 2614.1
## 250
        1786.97 1879.9 1928.3 2603.7
## 251
        1773.25 1865.7 1918.1 2593.6
        1781.62 1881.3 1931.4 2616.3
## 252
## 253
        1773.75 1873.1 1908.8 2598.4
## 254
        1773.75 1862.5 1891.8 2562.7
## 255
        1776.34 1869.3 1913.9 2584.8
## 256
        1770.72 1846.9 1885.8 2550.3
## 257
        1772.39 1847.1 1895.8 2560.6
## 258
        1762.55 1838.3 1899.6 2532.6
## 259
        1764.35 1845.8 1920.3 2557.3
## 260
        1752.83 1835.5 1915.3 2534.1
## 261
        1755.98 1846.6 1907.3 2515.8
        1754.95 1854.8 1900.6 2521.2
## 262
## 263
        1759.90 1845.3 1880.9 2493.9
## 264
       1759.84 1854.5 1873.5 2476.1
## 265 1776.50 1870.5 1883.6 2497.1
```

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## 266
       1769.98 1862.6 1868.5 2469.0
## 267
        1766.98 1856.6 1879.1 2493.7
## 268
        1752.29 1837.6 1847.8 2472.6
## 269
       1760.17 1846.7 1861.8 2497.9
## 270
        1750.32 1856.5 1859.4 2490.8
## 271
       1731.44 1841.8 1859.4 2478.3
       1735.51 1835.0 1859.4 2484.0
## 272
       1733.84 1844.4 1853.3 2486.4
## 273
## 274
       1730.78 1838.9 1851.2 2483.4
## 275
       1699.46 1805.6 1801.8 2431.9
## 276
       1652.71 1756.6 1767.9 2403.7
## 277
        1654.09 1786.1 1762.7 2415.6
## 278
       1636.81 1757.1 1727.5 2387.9
## 279
        1622.81 1762.8 1734.6 2399.5
## 280
       1613.36 1756.8 1734.6 2377.2
## 281
        1617.78 1761.9 1755.4 2348.0
## 282
        1617.18 1778.5 1769.0 2373.4
## 283
        1637.62 1812.7 1801.6 2423.2
## 284
       1622.20 1806.1 1782.6 2411.6
## 285
        1608.49 1798.1 1754.7 2399.6
## 286
       1605.11 1794.9 1784.4 2420.2
## 287
        1609.61 1805.4 1787.6 2407.5
       1624.94 1820.3 1798.0 2392.8
## 288
       1618.07 1819.6 1793.8 2377.6
## 289
## 290
       1611.96 1809.6 1777.3 2350.1
## 291
       1578.95 1799.9 1755.2 2325.7
## 292
       1561.39 1800.3 1737.8 2309.6
       1547.87 1793.3 1730.1 2303.1
## 293
## 294
        1548.63 1784.8 1722.4 2318.0
## 295
       1560.16 1791.7 1753.5 2356.8
## 296
        1554.76 1800.2 1757.3 2376.1
## 297
        1531.87 1788.6 1736.7 2354.7
## 298
        1526.14 1775.7 1734.2 2363.5
        1509.03 1753.5 1724.2 2359.4
## 299
## 300
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## 301
       1484.97 1727.9 1689.7 2311.1
## 302
       1464.03 1709.6 1667.7 2281.0
## 303
       1475.11 1704.6 1667.8 2285.0
       1516.12 1740.6 1687.6 2311.6
## 304
## 305
       1519.69 1745.7 1687.5 2312.6
       1529.97 1751.7 1684.9 2312.6
## 306
## 307
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## 308
       1515.53 1757.8 1711.4 2313.0
## 309
       1543.89 1774.2 1780.5 2381.9
       1534.72 1774.4 1779.0 2362.2
## 310
## 311
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## 312
       1536.71 1788.0 1763.7 2337.7
## 313
       1523.83 1779.1 1756.8 2327.5
## 314
       1527.10 1792.8 1774.2 2340.6
## 315
        1530.20 1812.0 1802.0 2370.9
## 316
       1601.50 1872.1 1873.6 2422.1
## 317
       1580.29 1851.4 1836.2 2370.0
## 318 1595.09 1873.4 1859.8 2378.3
## 319 1579.47 1889.6 1852.7 2483.9
```

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## 320
       1600.59 1897.5 1882.9 2567.0
## 321
        1566.00 1888.8 1826.1 2560.1
## 322
        1557.01 1900.4 1832.8 2586.0
## 323
       1542.74 1913.4 1828.9 2580.5
## 324
        1536.30 1909.9 1829.5 2621.2
        1510.66 1910.8 1843.5 2601.0
## 325
       1481.03 1879.2 1770.3 2560.0
## 326
## 327
        1483.83 1880.2 1731.9 2565.5
## 328
       1470.09 1878.3 1736.7 2553.0
## 329
        1484.78 1885.2 1724.0 2572.3
## 330
       1475.41 1867.6 1683.3 2549.7
        1402.34 1788.0 1611.0 2446.3
## 331
## 332
       1421.49 1820.5 1612.5 2488.4
## 333
       1434.61 1858.2 1654.2 2517.1
## 334
       1446.32 1870.3 1673.9 2538.8
## 335
        1437.65 1878.4 1657.3 2541.2
## 336
       1441.57 1881.5 1655.1 2557.2
## 337
        1471.64 1893.2 1685.1 2584.7
## 338
       1453.95 1889.3 1667.9 2574.7
## 339
        1453.79 1877.3 1650.0 2546.6
## 340
       1458.02 1884.0 1664.2 2563.9
## 341
        1479.59 1904.7 1679.1 2562.2
       1504.89 1922.7 1731.3 2617.0
## 342
       1496.54 1908.5 1722.2 2645.7
## 343
## 344
       1511.00 1911.4 1730.7 2658.1
## 345
       1528.86 1921.1 1766.4 2669.7
## 346
       1534.02 1930.8 1770.7 2661.6
## 347
        1536.60 1927.8 1774.5 2669.8
## 348
        1508.19 1908.3 1749.9 2650.4
## 349
       1493.54 1905.9 1730.9 2642.3
## 350
        1489.68 1911.1 1742.4 2658.3
## 351
        1482.44 1921.6 1742.4 2687.8
## 352
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## 1847 5867.52 8093.0 4122.4 5835.8
## 1848 5828.74 8102.7 4139.2 5844.1
## 1849 5906.33 8205.5 4197.6 5910.7
## 1850 5861.19 8239.5 4177.3 5837.0
## 1851 5774.38 8139.2 4095.0 5809.7
## 1852 5718.70 8170.2 4047.9 5736.1
## 1853 5614.77 7943.2 3976.4 5632.5
## 1854 5528.12 7846.2 3968.6 5594.1
## 1855 5598.32 7952.9 4041.9 5680.4
## 1856 5460.43 7721.3 3939.5 5587.6
## 1857 5285.78 7447.9 3846.0 5432.8
## 1858 5386.94 7607.5 3945.7 5462.2
  1859 5355.03 7552.6 3951.7 5399.5
## 1860 5473.72 7676.3 3995.0 5455.0
```

3. Find the descriptive statistics of the data frame generated and the structure of the data. # the summary function gives the very basic statistical information of the data frame # the str function displays the internal structure of the data frame

```
----- Descriptive Statistics ----\n\n")
cat("
          ----- Descriptive Statistics -----
##
summary(eustock)
                                                        FTSE
##
         DAX
                         SMI
                                         CAC
##
    Min.
           :1402
                    Min.
                           :1587
                                   Min.
                                           :1611
                                                   Min.
                                                           :2281
##
    1st Qu.:1744
                    1st Qu.:2166
                                   1st Qu.:1875
                                                   1st Qu.:2843
##
    Median:2141
                    Median:2796
                                   Median:1992
                                                   Median:3247
    Mean
           :2531
                    Mean
                           :3376
                                   Mean
                                           :2228
                                                   Mean
                                                           :3566
    3rd Qu.:2722
                    3rd Qu.:3812
                                   3rd Qu.:2274
                                                   3rd Qu.:3994
##
                   Max.
                                                   {\tt Max.}
##
    Max.
           :6186
                           :8412
                                   Max.
                                           :4388
                                                           :6179
cat("\n") #just for neatness, leaves an empty space w/o " "
```

```
cat(" -----\n\n")
##
          ----- Structure -----
str(eustock)
## 'data.frame':
                 1860 obs. of 4 variables:
## $ DAX : num 1629 1614 1607 1621 1618 ...
## $ SMI : num 1678 1688 1679 1684 1687 ...
## $ CAC : num 1773 1750 1718 1708 1723 ...
## $ FTSE: num 2444 2460 2448 2470 2485 ...
  4. Find the mean, min and max closing price of each column using indexing (both column index and
    name). #1 Using column index
\mathtt{cat}("----- \ \mathtt{DAX} \ ----- \ \backslash n \backslash n")
## ----- DAX -----
cat("Mean: ")
## Mean:
mean(as.numeric(eustock[,1]))
## [1] 2530.657
cat("Max: ")
## Max:
max(as.numeric(eustock[,1]))
## [1] 6186.09
cat("Min: ")
## Min:
min(as.numeric(eustock[,1]))
## [1] 1402.34
cat("\n")
```

```
cat("----\n\n")
## ----- SMI -----
cat("SMI: ")
## SMI:
mean(eustock[,2])
## [1] 3376.224
cat("Max: ")
## Max:
max(eustock[,2])
## [1] 8412
cat("Min: ")
## Min:
min(eustock[,2])
## [1] 1587.4
cat("\n")
cat("-----\n\n")
## ----- CAC -----
cat("Mean: ")
## Mean:
mean(eustock[,3])
## [1] 2227.828
cat("CAC: ")
## CAC:
```

```
max(eustock[,3])
## [1] 4388.5
cat("Min: ")
## Min:
min(eustock[,3])
## [1] 1611
cat("\n")
cat("-----\n\n")
## ----- FTSE -----
cat("Mean: ")
## Mean:
mean(eustock[,4])
## [1] 3565.643
cat("Max: ")
## Max:
max(eustock[,4])
## [1] 6179
cat("Min: ")
## Min:
min(eustock[,4])
## [1] 2281
\#2 Using Name Index
```

```
cat("-----\n\n")
## ----- DAX -----
cat("Mean: ")
## Mean:
mean(eustock$DAX)
## [1] 2530.657
cat("Max: ")
## Max:
max(eustock$DAX)
## [1] 6186.09
cat("Min: ")
## Min:
min(eustock$DAX)
## [1] 1402.34
cat("\n")
cat("----\n\n")
## ----- SMI -----
cat("SMI: ")
## SMI:
mean(eustock$SMI)
## [1] 3376.224
cat("Max: ")
## Max:
```

```
max(eustock$SMI)
## [1] 8412
cat("Min: ")
## Min:
min(eustock$SMI)
## [1] 1587.4
cat("\n")
cat("-----\n\n")
## ----- CAC -----
cat("Mean: ")
## Mean:
mean(eustock$CAC)
## [1] 2227.828
cat("CAC: ")
## CAC:
max(eustock$CAC)
## [1] 4388.5
cat("Min: ")
## Min:
min(eustock$CAC)
## [1] 1611
cat("\n")
```

[1] 2281

5. Find and create a column CAT_DAX that categorize the observations based on the DAX column. Criteria: If the values are less than or equals to 1744, then consider as A_1, if values are greater than or equals to 2722 then categorize as A_2 and rest as A_3.

```
 eustock CAT_DAX <- ifelse(eustock DAX <= 1744, "A_1", ifelse(eustock DAX >= 2722, "A_2", "A_3")) \\ eustock \\
```

```
##
            DAX
                   SMI
                          CAC
                                 FTSE CAT_DAX
        1628.75 1678.1 1772.8 2443.6
## 1
                                          A_1
## 2
        1613.63 1688.5 1750.5 2460.2
                                          A_1
## 3
        1606.51 1678.6 1718.0 2448.2
                                          A_1
## 4
        1621.04 1684.1 1708.1 2470.4
                                          A_1
## 5
        1618.16 1686.6 1723.1 2484.7
                                          A_1
## 6
        1610.61 1671.6 1714.3 2466.8
                                          A_1
## 7
        1630.75 1682.9 1734.5 2487.9
                                          A_1
        1640.17 1703.6 1757.4 2508.4
## 8
                                          A_1
## 9
        1635.47 1697.5 1754.0 2510.5
                                          A_1
## 10
        1645.89 1716.3 1754.3 2497.4
                                          A_1
## 11
        1647.84 1723.8 1759.8 2532.5
                                          A_1
        1638.35 1730.5 1755.5 2556.8
## 12
                                          A_1
```

```
## 13
        1629.93 1727.4 1758.1 2561.0
                                           A_1
## 14
        1621.49 1733.3 1757.5 2547.3
                                           A_1
        1624.74 1734.0 1763.5 2541.5
## 15
                                           A_1
        1627.63 1728.3 1762.8 2558.5
## 16
                                           A_1
## 17
        1631.99 1737.1 1768.9 2587.9
                                           A_1
## 18
        1621.18 1723.1 1778.1 2580.5
                                           A 1
        1613.42 1723.6 1780.1 2579.6
## 19
                                           A 1
        1604.95 1719.0 1767.7 2589.3
## 20
                                           A_1
## 21
        1605.75 1721.2 1757.9 2595.0
                                           A_1
## 22
        1616.67 1725.3 1756.6 2595.6
                                           A_1
## 23
        1619.29 1727.2 1754.7 2588.8
                                           A_1
        1620.49 1727.2 1766.8 2591.7
## 24
                                           A_1
## 25
        1619.67 1731.6 1766.5 2601.7
                                           A_1
        1623.07 1724.1 1762.2 2585.4
## 26
                                           A_1
## 27
        1613.98 1716.9 1759.5 2573.3
                                           A_1
## 28
        1631.87 1723.4 1782.4 2597.4
                                           A_1
## 29
        1630.37 1723.0 1789.5 2600.6
                                           A_1
## 30
        1633.47 1728.4 1783.5 2570.6
                                           A_1
## 31
        1626.55 1722.1 1780.4 2569.4
                                           A_1
## 32
        1650.43 1724.5 1808.8 2584.9
                                           A 1
## 33
        1650.06 1733.6 1820.3 2608.8
                                           A_1
## 34
        1654.11 1739.0 1820.3 2617.2
                                           A 1
## 35
        1653.60 1726.2 1820.3 2621.0
                                           A_1
        1501.82 1587.4 1687.5 2540.5
## 36
                                           A 1
        1524.28 1630.6 1725.6 2554.5
## 37
                                           A_1
## 38
        1603.65 1685.5 1792.9 2601.9
                                           A_1
## 39
        1622.49 1701.3 1819.1 2623.0
                                           A_1
        1636.68 1718.0 1833.5 2640.7
## 40
                                           A_1
## 41
        1652.10 1726.2 1853.4 2640.7
                                           A_1
## 42
        1645.81 1716.6 1849.7 2619.8
                                           A_1
## 43
        1650.36 1725.8 1851.8 2624.2
                                           A_1
## 44
        1651.55 1737.4 1857.7 2638.2
                                           A_1
## 45
        1649.88 1736.6 1864.3 2645.7
                                           A_1
        1653.52 1732.4 1863.5 2679.6
## 46
                                           A_1
## 47
        1657.51 1731.2 1873.2 2669.0
                                           A_1
## 48
        1649.55 1726.9 1860.8 2664.6
                                           A_1
## 49
        1649.09 1727.8 1868.7 2663.3
                                           A 1
## 50
        1646.41 1720.2 1860.4 2667.4
                                           A_1
## 51
        1638.65 1715.4 1855.9 2653.2
                                           A_1
## 52
        1625.80 1708.7 1840.5 2630.8
                                           A_1
        1628.64 1713.0 1842.6 2626.6
## 53
                                           A 1
## 54
        1632.22 1713.5 1861.2 2641.9
                                           A_1
## 55
        1633.65 1718.0 1876.2 2625.8
                                           A_1
## 56
        1631.17 1701.7 1878.3 2606.0
                                           A_1
        1635.80 1701.7 1878.4 2594.4
## 57
                                           A_1
## 58
        1621.27 1684.9 1869.4 2583.6
                                           A_1
        1624.70 1687.2 1880.4 2588.7
## 59
                                           A_1
        1616.13 1690.6 1885.5 2600.3
## 60
                                           A_1
## 61
        1618.12 1684.3 1888.4 2579.5
                                           A_1
## 62
        1627.80 1679.9 1885.2 2576.6
                                           A_1
## 63
        1625.79 1672.9 1877.9 2597.8
                                           A_1
## 64
        1614.80 1663.1 1876.5 2595.6
                                           A_1
## 65
        1612.80 1669.3 1883.8 2599.0
                                           A_1
        1605.47 1664.7 1880.6 2621.7
## 66
                                           A 1
```

```
## 67
        1609.32 1672.3 1887.4 2645.6
                                          A_1
## 68
        1607.48 1687.7 1878.3 2644.2
                                          A_1
        1607.48 1686.8 1867.1 2625.6
## 69
                                          A_1
## 70
        1604.89 1686.6 1851.9 2624.6
                                          A_1
## 71
        1589.12 1675.8 1843.6 2596.2
                                          A_1
## 72
        1582.27 1677.4 1848.1 2599.5
                                          A 1
        1567.99 1673.2 1843.4 2584.1
## 73
                                          A 1
        1568.16 1665.0 1843.6 2570.8
## 74
                                          A 1
## 75
        1569.71 1671.3 1833.8 2555.0
                                          A_1
## 76
        1571.74 1672.4 1833.4 2574.5
                                          A_1
## 77
        1585.41 1676.2 1856.9 2576.7
                                          A_1
        1570.01 1692.6 1863.4 2579.0
## 78
                                          A_1
## 79
        1561.89 1696.5 1855.5 2588.7
                                          A_1
## 80
        1565.18 1716.1 1864.2 2601.1
                                          A_1
## 81
        1570.34 1713.3 1846.0 2575.7
                                          A_1
## 82
        1577.00 1705.1 1836.8 2559.5
                                          A_1
## 83
        1590.29 1711.3 1830.4 2561.1
                                          A_1
## 84
        1572.72 1709.8 1831.6 2528.3
                                          A_1
## 85
        1572.07 1688.6 1834.8 2514.7
                                          A_1
## 86
        1579.19 1698.9 1852.1 2558.5
                                          A 1
## 87
        1588.73 1700.0 1849.8 2553.3
                                          A_1
## 88
        1586.01 1693.0 1861.8 2577.1
                                          A 1
## 89
        1579.77 1683.9 1856.7 2566.0
                                          A_1
## 90
        1572.58 1679.2 1856.7 2549.5
                                          A 1
## 91
        1568.09 1673.9 1841.5 2527.8
                                          A_1
## 92
        1578.21 1683.9 1846.9 2540.9
                                          A_1
## 93
        1573.94 1688.4 1836.1 2534.2
                                          A_1
        1582.06 1693.9 1838.6 2538.0
## 94
                                          A_1
## 95
        1610.18 1720.9 1857.6 2559.0
                                          A_1
## 96
        1605.16 1717.9 1857.6 2554.9
                                          A_1
## 97
        1623.84 1733.6 1858.4 2575.5
                                          A_1
## 98
        1615.26 1729.7 1846.8 2546.5
                                          A_1
## 99
        1627.08 1735.6 1868.5 2561.6
                                          A_1
        1626.97 1734.1 1863.2 2546.6
## 100
                                          A_1
## 101
        1605.70 1699.3 1808.3 2502.9
                                          A_1
## 102
        1589.70 1678.6 1765.1 2463.1
                                          A_1
## 103
        1589.70 1675.5 1763.5 2472.6
                                          A 1
## 104
        1603.26 1670.1 1766.0 2463.5
                                          A_1
        1599.75 1652.2 1741.3 2446.3
## 105
                                          A_1
## 106
        1590.86 1635.0 1743.3 2456.2
                                          A_1
        1603.50 1654.9 1769.0 2471.5
## 107
                                          A 1
## 108
        1589.86 1642.0 1757.9 2447.5
                                          A_1
## 109
        1587.92 1638.7 1754.9 2428.6
                                          A_1
## 110
        1571.06 1622.6 1739.7 2420.2
                                          A_1
## 111
        1549.81 1596.1 1708.8 2414.9
                                          A_1
        1549.36 1612.4 1722.2 2420.2
## 112
                                          A_1
## 113
        1554.65 1625.0 1713.9 2423.8
                                          A_1
        1557.52 1610.5 1703.2 2407.0
## 114
                                          A_1
## 115
        1555.31 1606.6 1685.7 2388.7
                                          A_1
## 116
        1559.76 1610.7 1663.4 2409.6
                                          A_1
        1548.44 1603.1 1636.9 2392.0
## 117
                                          A_1
## 118
        1543.99 1591.5 1645.6 2380.2
                                          A_1
## 119
       1550.21 1605.2 1671.6 2423.3
                                          A_1
## 120 1557.03 1621.4 1688.3 2451.6
                                          A 1
```

```
## 121
        1551.78 1622.5 1696.8 2440.8
                                          A_1
## 122
        1562.89 1626.6 1711.7 2432.9
                                          A_1
## 123
        1570.28 1627.4 1706.2 2413.6
                                          A 1
        1559.26 1614.9 1684.2 2391.6
## 124
                                          A_1
## 125
        1545.87 1602.3 1648.5 2358.1
                                          A_1
## 126
        1542.77 1598.3 1633.6 2345.4
                                          A 1
        1542.77 1627.0 1699.1 2384.4
## 127
                                          A 1
        1542.77 1627.0 1699.1 2384.4
## 128
                                          A 1
## 129
        1542.77 1627.0 1722.5 2384.4
                                          A 1
## 130
        1564.27 1655.7 1720.7 2418.7
                                          A_1
## 131
        1577.26 1670.1 1741.9 2420.0
                                          A_1
        1577.26 1670.1 1765.7 2493.1
## 132
                                          A_1
## 133
        1577.26 1670.1 1765.7 2493.1
                                          A_1
## 134
        1598.19 1670.1 1749.9 2492.8
                                          A_1
## 135
        1604.05 1704.0 1770.3 2504.1
                                          A_1
## 136
        1604.69 1711.8 1787.6 2493.2
                                          A_1
## 137
        1593.65 1700.5 1778.7 2482.9
                                          A_1
## 138
        1581.68 1690.3 1785.6 2467.1
                                          A_1
## 139
        1599.14 1715.4 1833.9 2497.9
                                          A_1
## 140
        1613.82 1723.5 1837.4 2477.9
                                          A 1
## 141
        1620.45 1719.4 1824.3 2490.1
                                          A_1
## 142
        1629.51 1734.4 1843.8 2516.3
                                          A 1
        1663.70 1772.8 1873.6 2537.1
## 143
                                          A_1
        1664.09 1760.3 1860.2 2541.6
## 144
                                          A 1
## 145
        1669.29 1747.2 1860.2 2536.7
                                          A_1
## 146
        1685.14 1750.2 1865.9 2544.9
                                          A_1
## 147
        1687.07 1755.3 1867.9 2543.4
                                          A_1
        1680.13 1754.6 1841.3 2522.0
## 148
                                          A_1
## 149
        1671.84 1751.2 1838.7 2525.3
                                          A_1
## 150
        1669.52 1752.5 1849.9 2510.4
                                          A_1
## 151
        1686.71 1769.4 1869.3 2539.9
                                          A_1
## 152
        1685.51 1767.6 1890.6 2552.0
                                          A_1
## 153
        1671.01 1750.0 1879.6 2546.5
                                          A_1
        1683.06 1747.1 1873.9 2550.8
## 154
                                          A_1
## 155
        1685.70 1753.5 1875.3 2571.2
                                          A 1
## 156
        1685.66 1752.8 1857.0 2560.2
                                          A_1
## 157
        1678.77 1752.9 1856.5 2556.8
                                          A 1
## 158
        1685.85 1764.7 1865.8 2547.1
                                          A_1
        1683.71 1776.8 1860.6 2534.3
                                          A_1
## 159
## 160
        1686.59 1779.3 1861.6 2517.2
                                          A_1
        1683.73 1785.1 1865.6 2538.4
## 161
                                          A 1
## 162
        1679.14 1798.2 1864.1 2537.1
                                          A_1
        1685.03 1794.1 1861.6 2523.7
## 163
                                          A_1
## 164
        1680.81 1795.2 1876.5 2522.6
                                          A_1
        1676.17 1780.4 1865.1 2513.9
## 165
                                          A_1
        1688.46 1789.5 1882.1 2541.0
                                          A_1
## 166
## 167
        1696.55 1794.2 1912.2 2555.9
                                          A_1
        1690.24 1784.4 1915.4 2536.7
## 168
                                          A_1
## 169
        1711.35 1800.1 1951.2 2543.4
                                          A_1
## 170
        1711.29 1804.0 1962.4 2542.3
                                          A_1
        1729.86 1816.2 1976.5 2559.7
## 171
                                          A_1
## 172
       1716.63 1810.5 1953.5 2546.8
                                          A_1
## 173 1743.36 1821.9 1981.3 2565.0
                                          A_1
## 174 1745.17 1828.2 1985.1 2562.0
                                          A3
```

```
## 175
       1746.76 1840.6 1983.4 2562.1
                                          A_3
## 176
        1749.29 1841.1 1979.7 2554.3
                                          A_3
        1763.86 1846.3 1983.8 2565.4
## 177
                                          A_3
        1762.27 1850.0 1988.1 2558.4
                                          A_3
## 178
## 179
        1762.29 1839.0 1973.0 2538.3
                                          A_3
## 180
        1746.77 1820.2 1966.9 2533.1
                                          A3
## 181
        1753.50 1815.2 1976.3 2550.7
                                          A3
        1753.21 1820.6 1993.9 2574.8
## 182
                                          A3
## 183
        1739.88 1807.1 1968.0 2522.4
                                          A_1
## 184
        1723.92 1791.4 1941.8 2493.3
                                          A_1
## 185
        1734.42 1806.2 1947.1 2476.0
                                          A_1
        1723.13 1798.7 1929.2 2470.7
## 186
                                          A_1
                                          A_1
## 187
        1732.92 1818.2 1943.6 2491.2
## 188
        1729.89 1820.5 1928.2 2464.7
                                          A_1
## 189
        1725.74 1833.3 1922.0 2467.6
                                          A_1
## 190
        1730.90 1837.1 1919.1 2456.6
                                          A_1
        1714.17 1818.2 1884.6 2441.0
## 191
                                          A_1
## 192
        1716.20 1824.1 1896.3 2458.7
                                          A_1
        1719.06 1830.1 1928.3 2464.9
## 193
                                          A_1
## 194
        1718.21 1835.6 1934.8 2472.2
                                          A 1
## 195
        1698.84 1828.7 1923.5 2447.9
                                          A_1
        1714.76 1839.2 1943.8 2452.9
## 196
                                          A_1
        1718.35 1837.2 1942.4 2440.1
## 197
                                          A_1
        1706.69 1826.7 1928.1 2408.6
## 198
                                          A 1
## 199
        1723.37 1838.0 1942.0 2405.4
                                          A_1
## 200
        1716.18 1829.1 1942.7 2382.7
                                          A_1
## 201
        1738.78 1843.1 1974.8 2400.9
                                          A_1
        1737.41 1850.5 1975.4 2404.2
## 202
                                          A_1
## 203
        1714.77 1827.1 1907.5 2393.2
                                          A_1
## 204
        1724.24 1829.1 1943.6 2436.4
                                          A_1
## 205
        1733.77 1848.0 1974.1 2572.6
                                          A_1
## 206
        1729.96 1840.5 1963.3 2591.0
                                          A_1
## 207
        1734.46 1853.8 1972.3 2600.5
                                          A_1
        1744.35 1874.1 1990.7 2640.2
## 208
                                          A_3
## 209
        1746.88 1871.3 1978.2 2638.6
                                          A_3
## 210
        1746.88 1871.3 1978.2 2638.6
                                          A_3
## 211
        1746.88 1871.3 1978.2 2638.6
                                          A3
## 212
        1747.47 1860.5 1980.4 2625.8
                                          A_3
## 213
        1753.10 1874.7 1983.7 2607.8
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## 1629 4104.93 5667.1 3005.4 5065.5
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## 1630 4135.09 5716.6 2985.6 5226.3
                                          A_2
## 1631 4116.52 5691.8 2989.0 5220.3
                                          A_2
## 1632 4154.89 5673.6 3008.3 5244.2
```

```
## 1633 4262.98 5754.7 3054.9 5317.1
                                          A_2
## 1634 4266.17 5825.0 3052.1 5296.1
                                          A_2
## 1635 4266.17 5929.0 3094.0 5330.8
                                          A_2
## 1636 4326.35 5897.4 3078.0 5300.0
                                          A_2
## 1637 4311.13 5846.9 3064.4 5305.6
                                          A_2
## 1638 4267.40 5822.3 3024.1 5262.1
                                          A 2
## 1639 4179.92 5732.2 2960.7 5217.8
                                          A 2
## 1640 4164.62 5699.5 2955.1 5227.3
                                          A 2
## 1641 4225.27 5792.8 3002.9 5300.1
                                          A_2
## 1642 4215.23 5836.3 3002.5 5298.9
                                          A_2
## 1643 4168.62 5815.9 2992.2 5263.7
                                          A_2
                                          A_2
## 1644 4149.92 5806.8 2992.9 5287.9
## 1645 4049.16 5751.6 2958.0 5271.1
                                          A_2
                                          A_2
## 1646 4069.25 5777.2 2946.7 5211.0
## 1647 4172.47 5862.9 2989.9 5225.9
                                          A_2
## 1648 4124.86 5803.2 2958.1 5148.8
                                          A_2
## 1649 3976.38 5651.8 2856.9 4991.5
                                          A_2
## 1650 3981.44 5689.5 2849.0 4970.2
                                          A_2
## 1651 3871.39 5533.5 2769.6 4840.7
                                          A_2
## 1652 3645.69 5279.7 2651.3 4755.4
                                          A 2
## 1653 3806.66 5479.0 2818.0 4871.8
                                          A_2
## 1654 3748.88 5370.9 2739.5 4801.9
                                          A_2
## 1655 3753.66 5467.2 2739.3 4842.3
                                          A_2
## 1656 3847.73 5581.6 2788.0 4906.4
                                          A 2
## 1657 3784.80 5538.2 2774.9 4897.4
                                          A_2
## 1658 3841.39 5601.6 2822.4 4908.3
                                          A_2
## 1659 3813.88 5557.4 2781.8 4863.8
                                          A_2
## 1660 3715.38 5438.6 2707.1 4764.3
                                          A_2
## 1661 3728.37 5459.7 2707.1 4806.8
                                          A_2
## 1662 3734.79 5483.9 2707.1 4793.7
                                          A_2
## 1663 3697.48 5434.0 2694.5 4720.4
                                          A_2
## 1664 3701.94 5418.2 2700.7 4711.0
                                          A_2
                                          A_2
## 1665 3676.65 5437.0 2698.9 4741.8
## 1666 3816.71 5565.0 2773.0 4867.0
                                          A_2
## 1667 3844.14 5574.2 2782.6 4845.4
                                          A_2
## 1668 3876.90 5571.7 2790.6 4830.1
                                          A_2
## 1669 3931.81 5650.4 2821.2 4908.4
                                          A 2
## 1670 3941.91 5725.5 2861.7 4985.8
                                          A_2
## 1671 3832.10 5645.7 2802.5 4898.6
                                          A_2
## 1672 3850.14 5666.3 2786.3 4863.5
                                          A_2
## 1673 3926.93 5738.3 2811.7 4891.2
                                          A_2
## 1674 3961.97 5772.4 2829.0 4889.0
                                          A_2
## 1675 3972.08 5775.9 2854.4 4831.8
                                          A_2
## 1676 4125.92 5875.1 2918.5 4921.8
                                          A_2
## 1677 4096.40 5919.9 2913.1 4977.6
                                          A_2
## 1678 4074.55 5922.7 2902.4 4970.7
                                          A_2
## 1679 4159.72 5969.5 2914.5 5082.3
                                          A_2
                                          A_2
## 1680 4191.81 6009.0 2910.1 5142.9
## 1681 4208.14 6095.3 2932.5 5187.4
                                          A_2
## 1682 4187.13 6103.2 2959.4 5177.1
                                          A_2
## 1683 4116.70 6056.6 2932.2 5130.7
                                          A_2
## 1684 4016.70 6021.8 2828.5 5035.9
                                          A_2
## 1685 4061.91 6018.7 2830.3 5045.2
                                          A_2
## 1686 4029.08 5986.6 2838.3 5121.8
```

```
## 1687 4150.31 6092.7 2912.2 5203.4
                                          A_2
## 1688 4154.57 6122.1 2893.3 5190.8
                                          A_2
## 1689 4162.92 6115.1 2894.5 5168.3
                                          A_2
## 1690 4055.35 5989.9 2822.9 5020.2
                                          A_2
## 1691 4125.54 6049.3 2869.7 5018.2
                                          A_2
## 1692 4132.79 6044.7 2858.1 5049.8
                                          A 2
## 1693 4132.79 6046.7 2874.1 5013.9
                                          A 2
## 1694 4132.79 6046.7 2874.1 5013.9
                                          A 2
## 1695 4132.79 6046.7 2875.1 5013.9
                                          A_2
## 1696 4266.02 6190.4 2939.5 5112.4
                                          A_2
## 1697 4224.30 6267.6 2975.5 5132.3
                                          A_2
                                          A_2
## 1698 4224.30 6265.5 2998.9 5135.5
## 1699 4224.30 6265.5 2998.9 5135.5
                                          A_2
                                          A_2
## 1700 4364.32 6265.5 3038.7 5193.5
## 1701 4416.95 6397.0 3072.8 5262.5
                                          A_2
## 1702 4360.05 6375.7 3037.7 5264.4
                                          A_2
## 1703 4339.98 6390.0 3006.7 5224.1
                                          A_2
## 1704 4293.64 6330.2 2954.9 5237.1
                                          A_2
## 1705 4237.75 6251.8 2919.8 5138.3
                                          A_2
## 1706 4134.64 6062.1 2862.5 5068.8
                                          A 2
## 1707 4150.01 6169.3 2902.9 5083.9
                                          A_2
## 1708 4145.41 6149.8 2919.8 5106.9
                                          A_2
## 1709 4140.22 6148.5 2932.8 5165.8
                                          A_2
## 1710 4216.24 6274.0 2976.1 5263.1
                                          A 2
## 1711 4290.05 6340.4 2987.0 5273.6
                                          A_2
## 1712 4310.83 6397.5 3008.3 5278.2
                                          A_2
## 1713 4250.47 6391.4 2998.1 5272.3
                                          A_2
## 1714 4238.77 6356.1 2988.6 5253.1
                                          A_2
## 1715 4222.16 6391.0 2966.2 5181.4
                                          A_2
## 1716 4266.34 6411.0 3000.5 5237.2
                                          A_2
## 1717 4316.05 6424.0 3052.0 5326.3
                                          A_2
## 1718 4385.29 6508.7 3088.3 5372.6
                                          A_2
                                          A_2
## 1719 4444.53 6530.4 3133.8 5422.4
## 1720 4442.53 6582.6 3172.1 5458.5
                                          A_2
## 1721 4529.88 6688.0 3187.5 5599.0
                                          A_2
## 1722 4529.18 6720.7 3188.4 5612.8
                                          A_2
## 1723 4509.25 6708.9 3166.3 5595.8
                                          A 2
## 1724 4494.72 6772.0 3189.6 5606.4
                                          A_2
## 1725 4536.91 6857.1 3216.7 5629.7
                                          A_2
## 1726 4519.56 6828.4 3220.9 5600.9
                                          A_2
## 1727 4558.62 6860.8 3235.8 5613.3
                                          A_2
## 1728 4552.46 6931.6 3240.0 5607.9
                                          A_2
## 1729 4509.37 6856.0 3178.7 5552.5
                                          A_2
## 1730 4522.42 6898.9 3187.7 5582.3
                                          A_2
## 1731 4535.56 6905.3 3225.1 5619.9
                                          A_2
                                          A_2
## 1732 4627.42 6990.5 3280.5 5709.5
## 1733 4611.66 6966.2 3281.7 5723.4
                                          A_2
                                          A_2
## 1734 4581.08 6953.2 3250.6 5718.5
## 1735 4583.03 6986.7 3262.5 5718.5
                                          A_2
## 1736 4610.66 6986.1 3273.5 5702.8
                                          A_2
## 1737 4604.55 6945.0 3262.3 5651.0
                                          A_2
## 1738 4704.58 7065.4 3348.2 5745.1
                                          A_2
## 1739 4695.78 7118.6 3397.0 5764.8
                                          A_2
## 1740 4693.86 7153.1 3421.9 5767.3
```

```
## 1741 4781.62 7273.0 3446.7 5820.6
                                          A_2
## 1742 4759.62 7259.5 3414.9 5807.7
                                          A_2
## 1743 4690.52 7130.5 3381.3 5733.1
                                          A_2
## 1744 4676.42 7077.3 3395.8 5695.6
                                          A_2
## 1745 4762.71 7197.2 3483.2 5782.9
                                          A_2
## 1746 4828.89 7187.5 3525.9 5818.9
                                          A 2
## 1747 4852.22 7246.5 3521.5 5828.5
                                          A 2
## 1748 4862.41 7276.7 3539.4 5829.8
                                          A 2
## 1749 4838.67 7267.9 3526.6 5794.8
                                          A_2
                                          A_2
## 1750 4872.24 7328.0 3540.2 5782.3
## 1751 4905.59 7261.2 3598.3 5785.1
                                          A_2
## 1752 4945.91 7236.5 3661.3 5834.9
                                          A_2
## 1753 4908.55 7132.4 3652.5 5903.6
                                          A_2
## 1754 4949.91 7143.8 3688.7 5997.9
                                          A_2
## 1755 5045.16 7300.5 3688.9 5956.3
                                          A_2
## 1756 5014.13 7341.0 3680.1 5947.0
                                          A_2
## 1757 5064.35 7407.4 3738.5 5983.7
                                          A_2
## 1758 5114.13 7472.1 3818.7 5967.8
                                          A_2
## 1759 5029.00 7415.9 3783.8 5905.6
                                          A_2
## 1760 5066.90 7530.3 3810.2 5939.3
                                          A 2
## 1761 5069.89 7536.3 3800.2 5911.9
                                          A_2
## 1762 5097.25 7585.5 3875.3 5932.2
                                          A_2
## 1763 5135.35 7615.5 3883.3 6017.6
                                          A_2
## 1764 5179.04 7638.8 3935.9 6052.8
                                          A_2
                                          A_2
## 1765 5254.32 7725.9 3932.0 6064.2
                                          A_2
## 1766 5345.89 7827.7 3986.8 6105.8
## 1767 5309.67 7744.3 3903.3 6094.0
                                          A_2
## 1768 5267.35 7588.1 3873.9 6055.2
                                          A_2
                                          A_2
## 1769 5312.25 7624.1 3894.5 6105.5
## 1770 5312.25 7624.1 3894.5 6105.5
                                          A_2
## 1771 5312.25 7624.1 3894.5 6105.5
                                          A_2
## 1772 5367.98 7662.9 3867.7 6104.1
                                          A_2
                                          A_2
## 1773 5359.24 7616.3 3884.6 6074.1
## 1774 5292.97 7500.1 3845.9 6002.0
                                          A_2
## 1775 5326.63 7453.7 3861.6 5922.2
                                          A_2
## 1776 5407.93 7500.1 3885.7 5954.1
                                          A_2
## 1777 5373.80 7369.1 3860.4 5955.0
                                          A 2
## 1778 5312.28 7308.9 3835.1 5931.1
                                          A_2
## 1779 5262.57 7265.5 3822.1 5898.1
                                          A_2
## 1780 5144.42 7232.3 3788.7 5863.9
                                          A_2
## 1781 5002.71 7053.5 3689.4 5722.4
                                          A_2
## 1782 5110.88 7180.1 3777.2 5806.6
                                          A_2
## 1783 5083.80 7241.8 3726.2 5833.1
                                          A_2
## 1784 5241.23 7401.4 3867.9 5928.3
                                          A_2
                                          A_2
## 1785 5241.23 7401.4 3867.9 6011.3
## 1786 5337.75 7640.8 3979.3 6011.3
                                          A_2
## 1787 5226.20 7596.2 3945.5 5986.5
                                          A_2
## 1788 5264.62 7610.8 3947.5 5992.4
                                          A_2
## 1789 5164.89 7536.0 3912.8 5938.0
                                          A_2
                                          A_2
## 1790 5270.61 7587.1 3912.8 5969.8
## 1791 5348.75 7677.5 4007.3 6028.3
                                          A_2
## 1792 5307.82 7627.3 3986.1 5956.7
                                          A_2
## 1793 5371.99 7582.8 4018.5 5972.9
                                          A_2
## 1794 5374.11 7550.6 4012.0 5948.5
```

```
## 1795 5414.31 7519.4 3990.2 5917.8
                                          A_2
## 1796 5343.66 7371.4 3945.3 5826.2
                                          A_2
## 1797 5441.00 7483.2 3980.8 5877.8
                                          A_2
## 1798 5514.51 7495.8 4047.9 5907.4
                                          A_2
## 1799 5514.51 7495.8 4047.9 5935.6
                                          A_2
## 1800 5530.19 7542.7 4049.8 5955.6
                                          A 2
## 1801 5592.46 7657.1 4108.7 5955.6
                                          A 2
## 1802 5639.89 7731.9 4115.9 5970.7
                                          A 2
## 1803 5466.88 7633.5 4017.4 5870.2
                                          A_2
                                          A_2
## 1804 5507.36 7605.0 4014.9 5862.3
                                          A_2
## 1805 5556.99 7656.1 4041.2 5870.7
                                          A_2
## 1806 5556.99 7656.1 4041.2 5837.9
## 1807 5583.83 7657.5 4087.0 5842.3
                                          A_2
                                          A_2
## 1808 5640.42 7676.3 4149.4 5898.4
## 1809 5605.38 7592.9 4119.0 5860.8
                                          A_2
## 1810 5724.75 7699.5 4185.1 5947.3
                                          A_2
## 1811 5787.05 7743.4 4204.6 6037.8
                                          A_2
## 1812 5773.77 7716.8 4201.9 6019.8
                                          A_2
## 1813 5799.22 7652.6 4208.6 5987.4
                                          A_2
## 1814 5799.22 7498.4 4141.6 5852.5
                                          A 2
## 1815 5631.34 7417.4 4050.8 5769.8
                                          A_2
## 1816 5581.24 7342.7 4005.3 5715.7
                                          A_2
## 1817 5621.71 7388.7 4013.3 5729.7
                                          A_2
## 1818 5742.83 7562.7 4092.9 5832.7
                                          A 2
## 1819 5689.89 7488.0 4052.3 5812.1
                                          A_2
## 1820 5644.22 7518.6 4027.3 5748.1
                                          A_2
## 1821 5648.11 7511.8 4018.6 5712.4
                                          A_2
## 1822 5748.34 7624.8 4065.0 5772.0
                                          A_2
## 1823 5784.40 7667.9 4126.3 5804.9
                                          A_2
## 1824 5886.72 7794.7 4203.8 5858.9
                                          A_2
## 1825 5870.49 7816.9 4215.7 5877.4
                                          A_2
## 1826 5933.73 7881.9 4248.2 5884.5
                                          A_2
                                          A_2
## 1827 5841.83 7882.0 4203.5 5832.5
## 1828 5910.51 8038.2 4260.7 5919.9
                                          A_2
## 1829 5905.15 8047.3 4252.1 5960.2
                                          A_2
## 1830 5961.45 8099.0 4304.4 5988.4
                                          A_2
## 1831 5942.06 8166.0 4311.1 5990.3
                                          A 2
## 1832 5975.88 8160.0 4333.1 6003.4
                                          A_2
## 1833 6018.89 8227.2 4339.9 6009.6
                                          A_2
## 1834 6000.84 8205.0 4319.2 5969.7
                                          A_2
## 1835 6001.24 8192.4 4256.4 5927.9
                                          A_2
## 1836 6023.31 8141.9 4256.4 5958.2
                                          A 2
## 1837 6101.90 8180.5 4256.4 6100.2
                                          A_2
## 1838 6106.10 8158.1 4344.3 6151.5
                                          A_2
## 1839 6108.00 8126.5 4358.1 6116.8
                                          A_2
                                          A_2
## 1840 6162.86 8288.2 4388.5 6174.0
## 1841 6186.09 8400.8 4368.9 6179.0
                                          A_2
                                          A_2
## 1842 6184.10 8412.0 4322.1 6132.7
## 1843 6081.11 8340.7 4220.1 5989.6
                                          A_2
## 1844 6043.82 8229.2 4235.9 5976.2
                                          A_2
## 1845 6040.58 8205.7 4205.4 5892.3
                                          A_2
## 1846 5854.35 7998.7 4139.5 5836.1
                                          A_2
## 1847 5867.52 8093.0 4122.4 5835.8
                                          A_2
## 1848 5828.74 8102.7 4139.2 5844.1
```

```
## 1849 5906.33 8205.5 4197.6 5910.7
                                          A_2
                                          A_2
## 1850 5861.19 8239.5 4177.3 5837.0
## 1851 5774.38 8139.2 4095.0 5809.7
                                          A_2
## 1852 5718.70 8170.2 4047.9 5736.1
                                          A_2
## 1853 5614.77 7943.2 3976.4 5632.5
                                          A_2
                                          A 2
## 1854 5528.12 7846.2 3968.6 5594.1
## 1855 5598.32 7952.9 4041.9 5680.4
                                          A 2
                                          A 2
## 1856 5460.43 7721.3 3939.5 5587.6
## 1857 5285.78 7447.9 3846.0 5432.8
                                          A_2
                                          A_2
## 1858 5386.94 7607.5 3945.7 5462.2
## 1859 5355.03 7552.6 3951.7 5399.5
                                          A_2
## 1860 5473.72 7676.3 3995.0 5455.0
                                          A_2
```

5. Count the number of values that fall in each of the categories.

```
cat("Total no of values in each categories:\n\n")
```

Total no of values in each categories:

```
summary(as.factor(eustock$CAT_DAX))
```

```
## A_1 A_2 A_3
## 465 465 930
```

6. Find and create a column CAT_FTSE that will save the modified values of FTSE based on the given condition. Criteria: For all the values less than the median of the column FTSE, if the value is even subtract a value to make it an odd values and for all values greater than or equal to median of FTSE and if the value is even convert to odd values by adding 1 to it.

```
##
            DAX
                    SMI
                                 FTSE CAT DAX CAT FTSE
                           CAC
## 1
        1628.75 1678.1 1772.8 2443.6
                                           A_1
                                                    2443
## 2
        1613.63 1688.5 1750.5 2460.2
                                           A_1
                                                    2459
## 3
        1606.51 1678.6 1718.0 2448.2
                                                    2447
                                           A 1
## 4
        1621.04 1684.1 1708.1 2470.4
                                           A_1
                                                    2469
        1618.16 1686.6 1723.1 2484.7
## 5
                                           A_1
                                                    2483
## 6
        1610.61 1671.6 1714.3 2466.8
                                           A_1
                                                    2465
## 7
        1630.75 1682.9 1734.5 2487.9
                                           A_1
                                                    2487
## 8
        1640.17 1703.6 1757.4 2508.4
                                                    2507
                                           A_1
```

```
## 9
        1635.47 1697.5 1754.0 2510.5
                                           A_1
                                                    2509
## 10
        1645.89 1716.3 1754.3 2497.4
                                           A_1
                                                   2497
## 11
        1647.84 1723.8 1759.8 2532.5
                                           A 1
                                                   2531
## 12
        1638.35 1730.5 1755.5 2556.8
                                                   2555
                                           A_1
## 13
        1629.93 1727.4 1758.1 2561.0
                                           A_1
                                                   2561
        1621.49 1733.3 1757.5 2547.3
## 14
                                                   2547
                                           A 1
        1624.74 1734.0 1763.5 2541.5
## 15
                                           A 1
                                                   2541
## 16
        1627.63 1728.3 1762.8 2558.5
                                           A_1
                                                   2557
## 17
        1631.99 1737.1 1768.9 2587.9
                                           A_1
                                                   2587
## 18
        1621.18 1723.1 1778.1 2580.5
                                           A_1
                                                   2579
## 19
        1613.42 1723.6 1780.1 2579.6
                                           A_1
                                                    2579
        1604.95 1719.0 1767.7 2589.3
                                                   2589
## 20
                                           A_1
## 21
        1605.75 1721.2 1757.9 2595.0
                                                   2595
                                           A_1
## 22
        1616.67 1725.3 1756.6 2595.6
                                           A_1
                                                   2595
## 23
        1619.29 1727.2 1754.7 2588.8
                                                   2587
                                           A_1
## 24
        1620.49 1727.2 1766.8 2591.7
                                           A_1
                                                    2591
## 25
        1619.67 1731.6 1766.5 2601.7
                                                   2601
                                           A_1
## 26
        1623.07 1724.1 1762.2 2585.4
                                                    2585
                                           A_1
## 27
        1613.98 1716.9 1759.5 2573.3
                                                   2573
                                           A_1
## 28
        1631.87 1723.4 1782.4 2597.4
                                           A_1
                                                    2597
## 29
        1630.37 1723.0 1789.5 2600.6
                                           A_1
                                                   2599
## 30
        1633.47 1728.4 1783.5 2570.6
                                                    2569
                                           A_1
        1626.55 1722.1 1780.4 2569.4
## 31
                                                   2569
                                           A_1
        1650.43 1724.5 1808.8 2584.9
## 32
                                           A 1
                                                   2583
        1650.06 1733.6 1820.3 2608.8
## 33
                                           A_1
                                                   2607
##
  34
        1654.11 1739.0 1820.3 2617.2
                                           A_1
                                                   2617
## 35
        1653.60 1726.2 1820.3 2621.0
                                                   2621
                                           A_1
##
  36
        1501.82 1587.4 1687.5 2540.5
                                           A_1
                                                   2539
## 37
        1524.28 1630.6 1725.6 2554.5
                                           A_1
                                                   2553
## 38
        1603.65 1685.5 1792.9 2601.9
                                           A_1
                                                   2601
## 39
        1622.49 1701.3 1819.1 2623.0
                                           A_1
                                                    2623
## 40
        1636.68 1718.0 1833.5 2640.7
                                           A_1
                                                   2639
## 41
        1652.10 1726.2 1853.4 2640.7
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## 1630 4135.09 5716.6 2985.6 5226.3
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## 1631 4116.52 5691.8 2989.0 5220.3
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## 1632 4154.89 5673.6 3008.3 5244.2
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## 1633 4262.98 5754.7 3054.9 5317.1
                                          A_2
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                                          A 2
## 1634 4266.17 5825.0 3052.1 5296.1
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## 1635 4266.17 5929.0 3094.0 5330.8
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## 1636 4326.35 5897.4 3078.0 5300.0
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## 1637 4311.13 5846.9 3064.4 5305.6
                                          A_2
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## 1638 4267.40 5822.3 3024.1 5262.1
                                          A_2
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## 1639 4179.92 5732.2 2960.7 5217.8
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## 1640 4164.62 5699.5 2955.1 5227.3
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## 1641 4225.27 5792.8 3002.9 5300.1
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## 1642 4215.23 5836.3 3002.5 5298.9
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## 1643 4168.62 5815.9 2992.2 5263.7
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## 1644 4149.92 5806.8 2992.9 5287.9
                                          A_2
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## 1645 4049.16 5751.6 2958.0 5271.1
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## 1646 4069.25 5777.2 2946.7 5211.0
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## 1647 4172.47 5862.9 2989.9 5225.9
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## 1648 4124.86 5803.2 2958.1 5148.8
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## 1649 3976.38 5651.8 2856.9 4991.5
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## 1650 3981.44 5689.5 2849.0 4970.2
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## 1651 3871.39 5533.5 2769.6 4840.7
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## 1652 3645.69 5279.7 2651.3 4755.4
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## 1653 3806.66 5479.0 2818.0 4871.8
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## 1654 3748.88 5370.9 2739.5 4801.9
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## 1655 3753.66 5467.2 2739.3 4842.3
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## 1656 3847.73 5581.6 2788.0 4906.4
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## 1657 3784.80 5538.2 2774.9 4897.4
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## 1658 3841.39 5601.6 2822.4 4908.3
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## 1659 3813.88 5557.4 2781.8 4863.8
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## 1660 3715.38 5438.6 2707.1 4764.3
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## 1661 3728.37 5459.7 2707.1 4806.8
                                          A_2
                                                  4807
## 1662 3734.79 5483.9 2707.1 4793.7
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## 1663 3697.48 5434.0 2694.5 4720.4
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## 1664 3701.94 5418.2 2700.7 4711.0
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                                                  4711
## 1665 3676.65 5437.0 2698.9 4741.8
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## 1666 3816.71 5565.0 2773.0 4867.0
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## 1667 3844.14 5574.2 2782.6 4845.4
                                          A_2
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## 1668 3876.90 5571.7 2790.6 4830.1
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## 1669 3931.81 5650.4 2821.2 4908.4
                                          A 2
                                                  4909
## 1670 3941.91 5725.5 2861.7 4985.8
                                          A 2
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## 1671 3832.10 5645.7 2802.5 4898.6
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## 1672 3850.14 5666.3 2786.3 4863.5
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## 1673 3926.93 5738.3 2811.7 4891.2
                                          A_2
                                                  4891
                                          A_2
## 1674 3961.97 5772.4 2829.0 4889.0
                                                  4889
## 1675 3972.08 5775.9 2854.4 4831.8
                                          A_2
                                                  4831
                                          A_2
## 1676 4125.92 5875.1 2918.5 4921.8
                                                  4921
## 1677 4096.40 5919.9 2913.1 4977.6
                                          A_2
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## 1678 4074.55 5922.7 2902.4 4970.7
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## 1679 4159.72 5969.5 2914.5 5082.3
                                          A_2
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## 1680 4191.81 6009.0 2910.1 5142.9
                                          A_2
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## 1681 4208.14 6095.3 2932.5 5187.4
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## 1682 4187.13 6103.2 2959.4 5177.1
                                          A 2
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## 1684 4016.70 6021.8 2828.5 5035.9
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## 1685 4061.91 6018.7 2830.3 5045.2
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## 1687 4150.31 6092.7 2912.2 5203.4
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## 1688 4154.57 6122.1 2893.3 5190.8
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## 1689 4162.92 6115.1 2894.5 5168.3
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## 1690 4055.35 5989.9 2822.9 5020.2
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## 1691 4125.54 6049.3 2869.7 5018.2
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## 1692 4132.79 6044.7 2858.1 5049.8
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## 1693 4132.79 6046.7 2874.1 5013.9
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## 1694 4132.79 6046.7 2874.1 5013.9
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                                                  5013
## 1695 4132.79 6046.7 2875.1 5013.9
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## 1696 4266.02 6190.4 2939.5 5112.4
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## 1697 4224.30 6267.6 2975.5 5132.3
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## 1698 4224.30 6265.5 2998.9 5135.5
                                          A_2
                                                  5135
## 1699 4224.30 6265.5 2998.9 5135.5
                                          A_2
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## 1700 4364.32 6265.5 3038.7 5193.5
                                          A_2
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## 1701 4416.95 6397.0 3072.8 5262.5
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## 1702 4360.05 6375.7 3037.7 5264.4
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## 1703 4339.98 6390.0 3006.7 5224.1
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## 1704 4293.64 6330.2 2954.9 5237.1
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## 1705 4237.75 6251.8 2919.8 5138.3
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## 1706 4134.64 6062.1 2862.5 5068.8
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## 1707 4150.01 6169.3 2902.9 5083.9
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## 1708 4145.41 6149.8 2919.8 5106.9
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## 1709 4140.22 6148.5 2932.8 5165.8
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## 1710 4216.24 6274.0 2976.1 5263.1
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## 1711 4290.05 6340.4 2987.0 5273.6
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## 1712 4310.83 6397.5 3008.3 5278.2
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## 1713 4250.47 6391.4 2998.1 5272.3
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## 1714 4238.77 6356.1 2988.6 5253.1
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## 1715 4222.16 6391.0 2966.2 5181.4
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## 1716 4266.34 6411.0 3000.5 5237.2
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## 1717 4316.05 6424.0 3052.0 5326.3
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## 1718 4385.29 6508.7 3088.3 5372.6
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## 1719 4444.53 6530.4 3133.8 5422.4
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## 1720 4442.53 6582.6 3172.1 5458.5
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                                                  5459
## 1721 4529.88 6688.0 3187.5 5599.0
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## 1722 4529.18 6720.7 3188.4 5612.8
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## 1723 4509.25 6708.9 3166.3 5595.8
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## 1724 4494.72 6772.0 3189.6 5606.4
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## 1725 4536.91 6857.1 3216.7 5629.7
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## 1726 4519.56 6828.4 3220.9 5600.9
                                          A_2
                                                  5601
## 1727 4558.62 6860.8 3235.8 5613.3
                                          A_2
                                                  5613
                                          A_2
## 1728 4552.46 6931.6 3240.0 5607.9
                                                  5607
## 1729 4509.37 6856.0 3178.7 5552.5
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                                                  5553
                                          A_2
## 1730 4522.42 6898.9 3187.7 5582.3
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## 1731 4535.56 6905.3 3225.1 5619.9
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                                                  5619
## 1732 4627.42 6990.5 3280.5 5709.5
                                          A_2
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## 1733 4611.66 6966.2 3281.7 5723.4
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## 1734 4581.08 6953.2 3250.6 5718.5
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                                                  5719
## 1735 4583.03 6986.7 3262.5 5718.5
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                                                  5719
## 1736 4610.66 6986.1 3273.5 5702.8
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## 1739 4695.78 7118.6 3397.0 5764.8
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## 1740 4693.86 7153.1 3421.9 5767.3
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## 1741 4781.62 7273.0 3446.7 5820.6
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## 1742 4759.62 7259.5 3414.9 5807.7
                                          A 2
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## 1743 4690.52 7130.5 3381.3 5733.1
                                          A 2
                                                  5733
## 1744 4676.42 7077.3 3395.8 5695.6
                                          A 2
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## 1745 4762.71 7197.2 3483.2 5782.9
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## 1746 4828.89 7187.5 3525.9 5818.9
                                          A_2
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## 1747 4852.22 7246.5 3521.5 5828.5
                                          A_2
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## 1748 4862.41 7276.7 3539.4 5829.8
                                          A_2
                                                  5829
## 1749 4838.67 7267.9 3526.6 5794.8
                                          A_2
                                                  5795
## 1750 4872.24 7328.0 3540.2 5782.3
                                          A_2
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## 1751 4905.59 7261.2 3598.3 5785.1
                                          A_2
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## 1752 4945.91 7236.5 3661.3 5834.9
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## 1753 4908.55 7132.4 3652.5 5903.6
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## 1754 4949.91 7143.8 3688.7 5997.9
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## 1755 5045.16 7300.5 3688.9 5956.3
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## 1756 5014.13 7341.0 3680.1 5947.0
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## 1757 5064.35 7407.4 3738.5 5983.7
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## 1758 5114.13 7472.1 3818.7 5967.8
                                          A_2
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## 1759 5029.00 7415.9 3783.8 5905.6
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                                                  5905
## 1760 5066.90 7530.3 3810.2 5939.3
                                          A 2
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## 1761 5069.89 7536.3 3800.2 5911.9
                                          A 2
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## 1762 5097.25 7585.5 3875.3 5932.2
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## 1763 5135.35 7615.5 3883.3 6017.6
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## 1764 5179.04 7638.8 3935.9 6052.8
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## 1765 5254.32 7725.9 3932.0 6064.2
                                          A_2
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## 1766 5345.89 7827.7 3986.8 6105.8
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## 1767 5309.67 7744.3 3903.3 6094.0
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                                                  6095
## 1768 5267.35 7588.1 3873.9 6055.2
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                                                  6055
## 1769 5312.25 7624.1 3894.5 6105.5
                                          A_2
                                                  6105
## 1770 5312.25 7624.1 3894.5 6105.5
                                          A_2
                                                  6105
## 1771 5312.25 7624.1 3894.5 6105.5
                                          A_2
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## 1772 5367.98 7662.9 3867.7 6104.1
                                          A_2
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## 1773 5359.24 7616.3 3884.6 6074.1
                                          A 2
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## 1774 5292.97 7500.1 3845.9 6002.0
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                                                  6003
## 1775 5326.63 7453.7 3861.6 5922.2
                                          A_2
                                                  5923
## 1776 5407.93 7500.1 3885.7 5954.1
                                          A_2
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## 1777 5373.80 7369.1 3860.4 5955.0
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## 1778 5312.28 7308.9 3835.1 5931.1
                                          A 2
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## 1779 5262.57 7265.5 3822.1 5898.1
                                          A_2
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## 1780 5144.42 7232.3 3788.7 5863.9
                                          A_2
                                                  5863
## 1781 5002.71 7053.5 3689.4 5722.4
                                          A_2
                                                  5723
                                          A_2
## 1782 5110.88 7180.1 3777.2 5806.6
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## 1783 5083.80 7241.8 3726.2 5833.1
                                          A_2
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## 1784 5241.23 7401.4 3867.9 5928.3
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                                                  5929
## 1785 5241.23 7401.4 3867.9 6011.3
                                          A_2
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## 1786 5337.75 7640.8 3979.3 6011.3
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## 1787 5226.20 7596.2 3945.5 5986.5
                                          A_2
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## 1788 5264.62 7610.8 3947.5 5992.4
                                          A_2
                                                  5993
## 1789 5164.89 7536.0 3912.8 5938.0
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                                                  5939
## 1790 5270.61 7587.1 3912.8 5969.8
                                          A 2
                                                  5969
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## 1792 5307.82 7627.3 3986.1 5956.7
                                          A_2
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## 1793 5371.99 7582.8 4018.5 5972.9
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## 1794 5374.11 7550.6 4012.0 5948.5
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## 1795 5414.31 7519.4 3990.2 5917.8
                                          A_2
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## 1796 5343.66 7371.4 3945.3 5826.2
                                          A 2
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## 1797 5441.00 7483.2 3980.8 5877.8
                                          A 2
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## 1798 5514.51 7495.8 4047.9 5907.4
                                          A 2
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## 1799 5514.51 7495.8 4047.9 5935.6
                                          A_2
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## 1800 5530.19 7542.7 4049.8 5955.6
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## 1801 5592.46 7657.1 4108.7 5955.6
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## 1802 5639.89 7731.9 4115.9 5970.7
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## 1803 5466.88 7633.5 4017.4 5870.2
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## 1804 5507.36 7605.0 4014.9 5862.3
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## 1805 5556.99 7656.1 4041.2 5870.7
                                          A_2
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## 1806 5556.99 7656.1 4041.2 5837.9
                                          A_2
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## 1807 5583.83 7657.5 4087.0 5842.3
                                          A_2
                                                  5843
## 1808 5640.42 7676.3 4149.4 5898.4
                                          A_2
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## 1809 5605.38 7592.9 4119.0 5860.8
                                          A_2
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## 1810 5724.75 7699.5 4185.1 5947.3
                                          A 2
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## 1811 5787.05 7743.4 4204.6 6037.8
                                          A_2
                                                  6037
## 1812 5773.77 7716.8 4201.9 6019.8
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## 1813 5799.22 7652.6 4208.6 5987.4
                                          A_2
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## 1814 5799.22 7498.4 4141.6 5852.5
                                          A 2
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## 1815 5631.34 7417.4 4050.8 5769.8
                                          A 2
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## 1816 5581.24 7342.7 4005.3 5715.7
                                          A_2
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## 1817 5621.71 7388.7 4013.3 5729.7
                                          A_2
                                                  5729
## 1818 5742.83 7562.7 4092.9 5832.7
                                          A_2
                                                  5833
## 1819 5689.89 7488.0 4052.3 5812.1
                                          A_2
                                                  5813
## 1820 5644.22 7518.6 4027.3 5748.1
                                          A_2
                                                  5749
## 1821 5648.11 7511.8 4018.6 5712.4
                                          A_2
                                                  5713
## 1822 5748.34 7624.8 4065.0 5772.0
                                          A_2
                                                  5773
## 1823 5784.40 7667.9 4126.3 5804.9
                                          A_2
                                                  5805
## 1824 5886.72 7794.7 4203.8 5858.9
                                                  5859
                                          A_2
## 1825 5870.49 7816.9 4215.7 5877.4
                                          A_2
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## 1826 5933.73 7881.9 4248.2 5884.5
                                          A_2
                                                  5885
## 1827 5841.83 7882.0 4203.5 5832.5
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## 1828 5910.51 8038.2 4260.7 5919.9
                                          A_2
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## 1829 5905.15 8047.3 4252.1 5960.2
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## 1830 5961.45 8099.0 4304.4 5988.4
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## 1831 5942.06 8166.0 4311.1 5990.3
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## 1832 5975.88 8160.0 4333.1 6003.4
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## 1833 6018.89 8227.2 4339.9 6009.6
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## 1834 6000.84 8205.0 4319.2 5969.7
                                          A_2
                                                  5969
## 1835 6001.24 8192.4 4256.4 5927.9
                                          A_2
                                                  5927
                                          A_2
## 1836 6023.31 8141.9 4256.4 5958.2
                                                  5959
## 1837 6101.90 8180.5 4256.4 6100.2
                                          A_2
                                                  6101
                                          A_2
## 1838 6106.10 8158.1 4344.3 6151.5
                                                  6151
## 1839 6108.00 8126.5 4358.1 6116.8
                                          A_2
                                                  6117
## 1840 6162.86 8288.2 4388.5 6174.0
                                          A_2
                                                  6175
## 1841 6186.09 8400.8 4368.9 6179.0
                                          A_2
                                                  6179
## 1842 6184.10 8412.0 4322.1 6132.7
                                          A_2
                                                  6133
## 1843 6081.11 8340.7 4220.1 5989.6
                                          A_2
                                                  5989
## 1844 6043.82 8229.2 4235.9 5976.2
                                          A 2
                                                  5977
```

```
## 1845 6040.58 8205.7 4205.4 5892.3
                                           A_2
                                                   5893
## 1846 5854.35 7998.7 4139.5 5836.1
                                           A_2
                                                   5837
## 1847 5867.52 8093.0 4122.4 5835.8
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  1848 5828.74 8102.7 4139.2 5844.1
                                           A_2
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   1849 5906.33 8205.5 4197.6 5910.7
                                           A_2
                                                   5911
  1850 5861.19 8239.5 4177.3 5837.0
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                                                   5837
## 1851 5774.38 8139.2 4095.0 5809.7
                                           A 2
                                                   5809
## 1852 5718.70 8170.2 4047.9 5736.1
                                           A 2
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  1853 5614.77 7943.2 3976.4 5632.5
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  1854 5528.12 7846.2 3968.6 5594.1
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  1855 5598.32 7952.9 4041.9 5680.4
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  1856 5460.43 7721.3 3939.5 5587.6
                                                   5587
  1857 5285.78 7447.9 3846.0 5432.8
                                           A_2
                                                   5433
## 1858 5386.94 7607.5 3945.7 5462.2
                                           A_2
                                                   5463
## 1859 5355.03 7552.6 3951.7 5399.5
                                                   5399
                                           A_2
## 1860 5473.72 7676.3 3995.0 5455.0
                                           A_2
                                                   5455
```

7. Create two columns that have the values of the expected opening price for the CAC stocks. Create first column OP1 as a vector with CAC value plus standard deviation of CAC and next column as a vector OP2 with CAC value minus standard deviation of CAC.

```
OP1 <- eustock$CAC + sd(eustock$CAC)
OP2 <- eustock$CAC - sd(eustock$CAC)

eustock$OP1 <- c(OP1)
eustock$OP2 <- c(OP2)
eustock</pre>
```

```
##
            DAX
                    SMI
                           CAC
                                 FTSE CAT DAX CAT FTSE
                                                              OP1
                                                                       0P2
## 1
        1628.75 1678.1 1772.8 2443.6
                                           A_1
                                                   2443 2353.114 1192.486
## 2
        1613.63 1688.5 1750.5 2460.2
                                                   2459 2330.814 1170.186
                                           A_1
##
  3
        1606.51 1678.6 1718.0 2448.2
                                           A_1
                                                   2447 2298.314 1137.686
        1621.04 1684.1 1708.1 2470.4
##
                                           A_1
                                                   2469 2288.414 1127.786
##
   5
        1618.16 1686.6 1723.1 2484.7
                                           A_1
                                                   2483 2303.414 1142.786
## 6
        1610.61 1671.6 1714.3 2466.8
                                           A_1
                                                   2465 2294.614 1133.986
## 7
        1630.75 1682.9 1734.5 2487.9
                                                   2487 2314.814 1154.186
                                           A_1
## 8
        1640.17 1703.6 1757.4 2508.4
                                                   2507 2337.714 1177.086
                                           A_1
##
  9
        1635.47 1697.5 1754.0 2510.5
                                                   2509 2334.314 1173.686
                                           A_1
## 10
        1645.89 1716.3 1754.3 2497.4
                                           A 1
                                                   2497 2334.614 1173.986
## 11
        1647.84 1723.8 1759.8 2532.5
                                                   2531 2340.114 1179.486
                                           A_1
##
  12
        1638.35 1730.5 1755.5 2556.8
                                           A_1
                                                   2555 2335.814 1175.186
##
  13
        1629.93 1727.4 1758.1 2561.0
                                                   2561 2338.414 1177.786
                                           A_1
## 14
        1621.49 1733.3 1757.5 2547.3
                                                   2547 2337.814 1177.186
                                           A_1
        1624.74 1734.0 1763.5 2541.5
                                                   2541 2343.814 1183.186
## 15
                                           A_1
##
  16
        1627.63 1728.3 1762.8 2558.5
                                           A_1
                                                   2557 2343.114 1182.486
## 17
        1631.99 1737.1 1768.9 2587.9
                                                   2587 2349.214 1188.586
                                           A_1
  18
        1621.18 1723.1 1778.1 2580.5
                                           A_1
                                                   2579 2358.414 1197.786
  19
        1613.42 1723.6 1780.1 2579.6
                                                   2579 2360.414 1199.786
##
                                           A_1
##
  20
        1604.95 1719.0 1767.7 2589.3
                                                   2589 2348.014 1187.386
                                           A_1
## 21
        1605.75 1721.2 1757.9 2595.0
                                           A_1
                                                   2595 2338.214 1177.586
## 22
        1616.67 1725.3 1756.6 2595.6
                                                   2595 2336.914 1176.286
                                           A_1
## 23
        1619.29 1727.2 1754.7 2588.8
                                           A_1
                                                   2587 2335.014 1174.386
## 24
        1620.49 1727.2 1766.8 2591.7
                                                   2591 2347.114 1186.486
                                           A_1
```

```
## 25
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                                          A_1
                                                   2601 2346.814 1186.186
## 26
        1623.07 1724.1 1762.2 2585.4
                                                   2585 2342.514 1181.886
                                          A_1
## 27
        1613.98 1716.9 1759.5 2573.3
                                          A 1
                                                   2573 2339.814 1179.186
        1631.87 1723.4 1782.4 2597.4
                                                   2597 2362.714 1202.086
## 28
                                          A_1
## 29
        1630.37 1723.0 1789.5 2600.6
                                          A_1
                                                   2599 2369.814 1209.186
## 30
        1633.47 1728.4 1783.5 2570.6
                                                  2569 2363.814 1203.186
                                          A 1
## 31
        1626.55 1722.1 1780.4 2569.4
                                          A 1
                                                  2569 2360.714 1200.086
## 32
        1650.43 1724.5 1808.8 2584.9
                                          A_1
                                                  2583 2389.114 1228.486
## 33
        1650.06 1733.6 1820.3 2608.8
                                          A_1
                                                   2607 2400.614 1239.986
## 34
        1654.11 1739.0 1820.3 2617.2
                                          A_1
                                                   2617 2400.614 1239.986
##
  35
        1653.60 1726.2 1820.3 2621.0
                                                   2621 2400.614 1239.986
                                          A_1
        1501.82 1587.4 1687.5 2540.5
                                                   2539 2267.814 1107.186
##
  36
                                          A_1
##
  37
        1524.28 1630.6 1725.6 2554.5
                                                   2553 2305.914 1145.286
                                          A_1
        1603.65 1685.5 1792.9 2601.9
## 38
                                          A_1
                                                   2601 2373.214 1212.586
## 39
        1622.49 1701.3 1819.1 2623.0
                                                   2623 2399.414 1238.786
                                          A_1
## 40
        1636.68 1718.0 1833.5 2640.7
                                          A_1
                                                   2639 2413.814 1253.186
## 41
        1652.10 1726.2 1853.4 2640.7
                                                   2639 2433.714 1273.086
                                          A_1
## 42
        1645.81 1716.6 1849.7 2619.8
                                                   2619 2430.014 1269.386
                                          A_1
        1650.36 1725.8 1851.8 2624.2
                                                  2623 2432.114 1271.486
## 43
                                          A_1
## 44
        1651.55 1737.4 1857.7 2638.2
                                          A_1
                                                   2637 2438.014 1277.386
## 45
        1649.88 1736.6 1864.3 2645.7
                                          A_1
                                                  2645 2444.614 1283.986
        1653.52 1732.4 1863.5 2679.6
                                                   2679 2443.814 1283.186
## 46
                                          A_1
        1657.51 1731.2 1873.2 2669.0
                                                  2669 2453.514 1292.886
## 47
                                          A_1
                                          A_1
## 48
        1649.55 1726.9 1860.8 2664.6
                                                  2663 2441.114 1280.486
## 49
        1649.09 1727.8 1868.7 2663.3
                                          A 1
                                                  2663 2449.014 1288.386
## 50
        1646.41 1720.2 1860.4 2667.4
                                          A_1
                                                   2667 2440.714 1280.086
        1638.65 1715.4 1855.9 2653.2
                                                   2653 2436.214 1275.586
## 51
                                          A_1
## 52
        1625.80 1708.7 1840.5 2630.8
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                                          A_1
                                                   2625 2422.914 1262.286
## 53
        1628.64 1713.0 1842.6 2626.6
                                          A_1
## 54
        1632.22 1713.5 1861.2 2641.9
                                                   2641 2441.514 1280.886
                                          A_1
## 55
        1633.65 1718.0 1876.2 2625.8
                                          A_1
                                                   2625 2456.514 1295.886
## 56
        1631.17 1701.7 1878.3 2606.0
                                          A_1
                                                   2605 2458.614 1297.986
## 57
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                                                   2593 2458.714 1298.086
                                          A_1
        1621.27 1684.9 1869.4 2583.6
## 58
                                                   2583 2449.714 1289.086
                                          A_1
## 59
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                                                   2587 2460.714 1300.086
                                          A_1
        1616.13 1690.6 1885.5 2600.3
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## 60
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## 61
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        1627.80 1679.9 1885.2 2576.6
                                                  2575 2465.514 1304.886
## 62
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        1625.79 1672.9 1877.9 2597.8
                                                   2597 2458.214 1297.586
## 63
                                          A_1
## 64
        1614.80 1663.1 1876.5 2595.6
                                                  2595 2456.814 1296.186
                                          A_1
## 65
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                                          A 1
                                                  2599 2464.114 1303.486
        1605.47 1664.7 1880.6 2621.7
                                                  2621 2460.914 1300.286
## 66
                                          A_1
## 67
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                                          A_1
                                                  2645 2467.714 1307.086
        1607.48 1687.7 1878.3 2644.2
                                                  2643 2458.614 1297.986
## 68
                                          A_1
## 69
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                                          A_1
                                                   2625 2447.414 1286.786
        1604.89 1686.6 1851.9 2624.6
                                                   2623 2432.214 1271.586
## 70
                                          A_1
## 71
        1589.12 1675.8 1843.6 2596.2
                                          A_1
                                                   2595 2423.914 1263.286
## 72
        1582.27 1677.4 1848.1 2599.5
                                          A_1
                                                   2599 2428.414 1267.786
## 73
        1567.99 1673.2 1843.4 2584.1
                                                   2583 2423.714 1263.086
                                          A_1
## 74
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                                                   2569 2423.914 1263.286
                                          A_1
        1569.71 1671.3 1833.8 2555.0
## 75
                                                   2555 2414.114 1253.486
                                          A_1
## 76
        1571.74 1672.4 1833.4 2574.5
                                          A_1
                                                   2573 2413.714 1253.086
## 77
        1585.41 1676.2 1856.9 2576.7
                                                  2575 2437.214 1276.586
                                          A_1
## 78
        1570.01 1692.6 1863.4 2579.0
                                                   2579 2443.714 1283.086
                                          A 1
```

```
## 79
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                                          A_1
                                                  2587 2435.814 1275.186
## 80
                                                  2601 2444.514 1283.886
        1565.18 1716.1 1864.2 2601.1
                                          A_1
                                                  2575 2426.314 1265.686
## 81
        1570.34 1713.3 1846.0 2575.7
                                          A 1
        1577.00 1705.1 1836.8 2559.5
                                                  2559 2417.114 1256.486
## 82
                                          A_1
## 83
        1590.29 1711.3 1830.4 2561.1
                                          A_1
                                                  2561 2410.714 1250.086
        1572.72 1709.8 1831.6 2528.3
## 84
                                                  2527 2411.914 1251.286
                                          A 1
## 85
        1572.07 1688.6 1834.8 2514.7
                                          A 1
                                                  2513 2415.114 1254.486
## 86
        1579.19 1698.9 1852.1 2558.5
                                          A_1
                                                  2557 2432.414 1271.786
## 87
        1588.73 1700.0 1849.8 2553.3
                                          A_1
                                                  2553 2430.114 1269.486
## 88
        1586.01 1693.0 1861.8 2577.1
                                          A_1
                                                  2577 2442.114 1281.486
## 89
        1579.77 1683.9 1856.7 2566.0
                                                  2565 2437.014 1276.386
                                          A_1
        1572.58 1679.2 1856.7 2549.5
                                                  2549 2437.014 1276.386
## 90
                                          A_1
## 91
        1568.09 1673.9 1841.5 2527.8
                                                  2527 2421.814 1261.186
                                          A_1
## 92
        1578.21 1683.9 1846.9 2540.9
                                          A_1
                                                  2539 2427.214 1266.586
        1573.94 1688.4 1836.1 2534.2
                                                  2533 2416.414 1255.786
## 93
                                          A_1
## 94
        1582.06 1693.9 1838.6 2538.0
                                          A_1
                                                  2537 2418.914 1258.286
        1610.18 1720.9 1857.6 2559.0
                                                  2559 2437.914 1277.286
## 95
                                          A_1
## 96
        1605.16 1717.9 1857.6 2554.9
                                                  2553 2437.914 1277.286
                                          A_1
        1623.84 1733.6 1858.4 2575.5
                                                  2575 2438.714 1278.086
## 97
                                          A_1
## 98
        1615.26 1729.7 1846.8 2546.5
                                          A_1
                                                  2545 2427.114 1266.486
## 99
        1627.08 1735.6 1868.5 2561.6
                                          A_1
                                                  2561 2448.814 1288.186
        1626.97 1734.1 1863.2 2546.6
                                                  2545 2443.514 1282.886
## 100
                                          A_1
                                                  2501 2388.614 1227.986
        1605.70 1699.3 1808.3 2502.9
## 101
                                          A_1
        1589.70 1678.6 1765.1 2463.1
                                                  2463 2345.414 1184.786
## 102
                                          A 1
## 103
        1589.70 1675.5 1763.5 2472.6
                                          A 1
                                                  2471 2343.814 1183.186
## 104
        1603.26 1670.1 1766.0 2463.5
                                          A_1
                                                  2463 2346.314 1185.686
## 105
        1599.75 1652.2 1741.3 2446.3
                                                  2445 2321.614 1160.986
                                          A_1
## 106
        1590.86 1635.0 1743.3 2456.2
                                          A_1
                                                  2455 2323.614 1162.986
        1603.50 1654.9 1769.0 2471.5
                                                  2471 2349.314 1188.686
## 107
                                          A_1
## 108
        1589.86 1642.0 1757.9 2447.5
                                                  2447 2338.214 1177.586
                                          A_1
## 109
        1587.92 1638.7 1754.9 2428.6
                                          A_1
                                                  2427 2335.214 1174.586
## 110
        1571.06 1622.6 1739.7 2420.2
                                          A_1
                                                  2419 2320.014 1159.386
## 111
        1549.81 1596.1 1708.8 2414.9
                                          A_1
                                                  2413 2289.114 1128.486
                                                  2419 2302.514 1141.886
        1549.36 1612.4 1722.2 2420.2
## 112
                                          A_1
        1554.65 1625.0 1713.9 2423.8
                                                  2423 2294.214 1133.586
## 113
                                          A_1
        1557.52 1610.5 1703.2 2407.0
                                                  2407 2283.514 1122.886
## 114
                                          A_1
## 115
        1555.31 1606.6 1685.7 2388.7
                                          A 1
                                                  2387 2266.014 1105.386
        1559.76 1610.7 1663.4 2409.6
                                                  2409 2243.714 1083.086
## 116
                                          A_1
        1548.44 1603.1 1636.9 2392.0
                                                  2391 2217.214 1056.586
## 117
                                          A_1
        1543.99 1591.5 1645.6 2380.2
                                                  2379 2225.914 1065.286
## 118
                                          A_1
                                          A_1
                                                  2423 2251.914 1091.286
## 119
        1550.21 1605.2 1671.6 2423.3
## 120
        1557.03 1621.4 1688.3 2451.6
                                                  2451 2268.614 1107.986
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## 121
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                                          A_1
                                                  2439 2277.114 1116.486
## 122
        1562.89 1626.6 1711.7 2432.9
                                                  2431 2292.014 1131.386
                                          A_1
## 123
        1570.28 1627.4 1706.2 2413.6
                                          A_1
                                                  2413 2286.514 1125.886
        1559.26 1614.9 1684.2 2391.6
                                                  2391 2264.514 1103.886
## 124
                                          A_1
                                          A_1
## 125
        1545.87 1602.3 1648.5 2358.1
                                                  2357 2228.814 1068.186
## 126
        1542.77 1598.3 1633.6 2345.4
                                          A_1
                                                  2345 2213.914 1053.286
## 127
        1542.77 1627.0 1699.1 2384.4
                                                  2383 2279.414 1118.786
                                          A_1
## 128
        1542.77 1627.0 1699.1 2384.4
                                                  2383 2279.414 1118.786
                                          A_1
        1542.77 1627.0 1722.5 2384.4
## 129
                                                  2383 2302.814 1142.186
                                          A_1
## 130
        1564.27 1655.7 1720.7 2418.7
                                          A_1
                                                  2417 2301.014 1140.386
## 131
       1577.26 1670.1 1741.9 2420.0
                                                  2419 2322.214 1161.586
                                          A_1
## 132 1577.26 1670.1 1765.7 2493.1
                                          A 1
                                                  2493 2346.014 1185.386
```

```
## 133
       1577.26 1670.1 1765.7 2493.1
                                          A_1
                                                  2493 2346.014 1185.386
## 134
        1598.19 1670.1 1749.9 2492.8
                                                  2491 2330.214 1169.586
                                          A_1
## 135
        1604.05 1704.0 1770.3 2504.1
                                          A_1
                                                  2503 2350.614 1189.986
## 136
        1604.69 1711.8 1787.6 2493.2
                                                  2493 2367.914 1207.286
                                          A_1
## 137
        1593.65 1700.5 1778.7 2482.9
                                          A_1
                                                  2481 2359.014 1198.386
## 138
       1581.68 1690.3 1785.6 2467.1
                                                  2467 2365.914 1205.286
                                          A 1
## 139
       1599.14 1715.4 1833.9 2497.9
                                          A 1
                                                  2497 2414.214 1253.586
## 140
       1613.82 1723.5 1837.4 2477.9
                                          A_1
                                                  2477 2417.714 1257.086
## 141
        1620.45 1719.4 1824.3 2490.1
                                          A_1
                                                  2489 2404.614 1243.986
## 142
       1629.51 1734.4 1843.8 2516.3
                                          A_1
                                                  2515 2424.114 1263.486
## 143
       1663.70 1772.8 1873.6 2537.1
                                          A_1
                                                  2537 2453.914 1293.286
        1664.09 1760.3 1860.2 2541.6
                                                  2541 2440.514 1279.886
## 144
                                          A_1
## 145
        1669.29 1747.2 1860.2 2536.7
                                                  2535 2440.514 1279.886
                                          A_1
        1685.14 1750.2 1865.9 2544.9
## 146
                                          A_1
                                                  2543 2446.214 1285.586
## 147
        1687.07 1755.3 1867.9 2543.4
                                                  2543 2448.214 1287.586
                                          A_1
## 148
        1680.13 1754.6 1841.3 2522.0
                                          A_1
                                                  2521 2421.614 1260.986
        1671.84 1751.2 1838.7 2525.3
## 149
                                                  2525 2419.014 1258.386
                                          A_1
## 150
        1669.52 1752.5 1849.9 2510.4
                                                  2509 2430.214 1269.586
                                          A_1
                                                  2539 2449.614 1288.986
       1686.71 1769.4 1869.3 2539.9
## 151
                                          A_1
## 152
        1685.51 1767.6 1890.6 2552.0
                                          A_1
                                                  2551 2470.914 1310.286
## 153
        1671.01 1750.0 1879.6 2546.5
                                          A_1
                                                  2545 2459.914 1299.286
        1683.06 1747.1 1873.9 2550.8
                                                  2549 2454.214 1293.586
## 154
                                          A_1
       1685.70 1753.5 1875.3 2571.2
                                                  2571 2455.614 1294.986
## 155
                                          A_1
        1685.66 1752.8 1857.0 2560.2
                                                  2559 2437.314 1276.686
## 156
                                          A 1
## 157
        1678.77 1752.9 1856.5 2556.8
                                          A_1
                                                  2555 2436.814 1276.186
## 158
        1685.85 1764.7 1865.8 2547.1
                                          A_1
                                                  2547 2446.114 1285.486
        1683.71 1776.8 1860.6 2534.3
                                                  2533 2440.914 1280.286
## 159
                                          A_1
## 160
        1686.59 1779.3 1861.6 2517.2
                                                  2517 2441.914 1281.286
                                          A_1
        1683.73 1785.1 1865.6 2538.4
                                                  2537 2445.914 1285.286
## 161
                                          A_1
## 162
        1679.14 1798.2 1864.1 2537.1
                                                  2537 2444.414 1283.786
                                          A_1
## 163
        1685.03 1794.1 1861.6 2523.7
                                          A_1
                                                  2523 2441.914 1281.286
## 164
        1680.81 1795.2 1876.5 2522.6
                                          A_1
                                                  2521 2456.814 1296.186
## 165
        1676.17 1780.4 1865.1 2513.9
                                          A_1
                                                  2513 2445.414 1284.786
                                                  2541 2462.414 1301.786
        1688.46 1789.5 1882.1 2541.0
## 166
                                          A_1
        1696.55 1794.2 1912.2 2555.9
                                                  2555 2492.514 1331.886
## 167
                                          A_1
        1690.24 1784.4 1915.4 2536.7
                                                  2535 2495.714 1335.086
## 168
                                          A_1
## 169
        1711.35 1800.1 1951.2 2543.4
                                          A 1
                                                  2543 2531.514 1370.886
       1711.29 1804.0 1962.4 2542.3
                                                  2541 2542.714 1382.086
## 170
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       1729.86 1816.2 1976.5 2559.7
                                                  2559 2556.814 1396.186
## 171
                                          A_1
       1716.63 1810.5 1953.5 2546.8
## 172
                                                  2545 2533.814 1373.186
                                          A_1
       1743.36 1821.9 1981.3 2565.0
                                                  2565 2561.614 1400.986
## 173
                                          A_1
       1745.17 1828.2 1985.1 2562.0
                                                  2561 2565.414 1404.786
## 174
                                          A_3
## 175
       1746.76 1840.6 1983.4 2562.1
                                          A_3
                                                  2561 2563.714 1403.086
## 176
       1749.29 1841.1 1979.7 2554.3
                                                  2553 2560.014 1399.386
                                          A_3
## 177
       1763.86 1846.3 1983.8 2565.4
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                                                  2565 2564.114 1403.486
       1762.27 1850.0 1988.1 2558.4
                                          A_3
                                                  2557 2568.414 1407.786
## 178
## 179
        1762.29 1839.0 1973.0 2538.3
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## 1674 3961.97 5772.4 2829.0 4889.0
                                        A_2
                                              4889 3409.314 2248.686
## 1675 3972.08 5775.9 2854.4 4831.8
                                        A_2
                                                4831 3434.714 2274.086
## 1676 4125.92 5875.1 2918.5 4921.8
                                        A_2
                                                4921 3498.814 2338.186
                                        A_2
## 1677 4096.40 5919.9 2913.1 4977.6
                                                4977 3493.414 2332.786
## 1678 4074.55 5922.7 2902.4 4970.7
                                        A_2
                                                4971 3482.714 2322.086
## 1679 4159.72 5969.5 2914.5 5082.3
                                        A_2
                                                5083 3494.814 2334.186
## 1680 4191.81 6009.0 2910.1 5142.9
                                        A_2
                                                5143 3490.414 2329.786
## 1681 4208.14 6095.3 2932.5 5187.4
                                        A 2
                                                5187 3512.814 2352.186
## 1682 4187.13 6103.2 2959.4 5177.1
                                        A_2
                                                5177 3539.714 2379.086
## 1683 4116.70 6056.6 2932.2 5130.7
                                        A_2
                                                5131 3512.514 2351.886
## 1684 4016.70 6021.8 2828.5 5035.9
                                        A_2
                                                5035 3408.814 2248.186
## 1685 4061.91 6018.7 2830.3 5045.2
                                                5045 3410.614 2249.986
                                        A_2
## 1686 4029.08 5986.6 2838.3 5121.8
                                        A_2
                                                5121 3418.614 2257.986
## 1687 4150.31 6092.7 2912.2 5203.4
                                        A_2
                                                5203 3492.514 2331.886
## 1688 4154.57 6122.1 2893.3 5190.8
                                        A_2
                                                5191 3473.614 2312.986
## 1689 4162.92 6115.1 2894.5 5168.3
                                        A_2
                                                5169 3474.814 2314.186
## 1690 4055.35 5989.9 2822.9 5020.2
                                        A_2
                                                5021 3403.214 2242.586
## 1691 4125.54 6049.3 2869.7 5018.2
                                        A_2
                                                5019 3450.014 2289.386
## 1692 4132.79 6044.7 2858.1 5049.8
                                        A_2
                                                5049 3438.414 2277.786
## 1693 4132.79 6046.7 2874.1 5013.9
                                        A_2
                                                5013 3454.414 2293.786
## 1694 4132.79 6046.7 2874.1 5013.9
                                        A_2
                                                5013 3454.414 2293.786
                                                5013 3455.414 2294.786
## 1695 4132.79 6046.7 2875.1 5013.9
                                        A_2
## 1696 4266.02 6190.4 2939.5 5112.4
                                        A_2
                                                5113 3519.814 2359.186
## 1697 4224.30 6267.6 2975.5 5132.3
                                        A_2
                                                5133 3555.814 2395.186
## 1698 4224.30 6265.5 2998.9 5135.5
                                        A 2
                                                5135 3579.214 2418.586
```

```
## 1699 4224.30 6265.5 2998.9 5135.5
                                        A_2
                                                 5135 3579.214 2418.586
## 1700 4364.32 6265.5 3038.7 5193.5
                                                 5193 3619.014 2458.386
                                        A_2
## 1701 4416.95 6397.0 3072.8 5262.5
                                        A_2
                                                 5263 3653.114 2492.486
## 1702 4360.05 6375.7 3037.7 5264.4
                                        A_2
                                                5265 3618.014 2457.386
## 1703 4339.98 6390.0 3006.7 5224.1
                                        A_2
                                                 5225 3587.014 2426.386
## 1704 4293.64 6330.2 2954.9 5237.1
                                        A 2
                                                5237 3535.214 2374.586
## 1705 4237.75 6251.8 2919.8 5138.3
                                                5139 3500.114 2339.486
                                        A 2
                                        A_2
## 1706 4134.64 6062.1 2862.5 5068.8
                                                5069 3442.814 2282.186
## 1707 4150.01 6169.3 2902.9 5083.9
                                        A_2
                                                 5083 3483.214 2322.586
## 1708 4145.41 6149.8 2919.8 5106.9
                                        A_2
                                                5107 3500.114 2339.486
## 1709 4140.22 6148.5 2932.8 5165.8
                                        A_2
                                                 5165 3513.114 2352.486
## 1710 4216.24 6274.0 2976.1 5263.1
                                        A_2
                                                5263 3556.414 2395.786
## 1711 4290.05 6340.4 2987.0 5273.6
                                        A_2
                                                5273 3567.314 2406.686
## 1712 4310.83 6397.5 3008.3 5278.2
                                        A_2
                                                5279 3588.614 2427.986
## 1713 4250.47 6391.4 2998.1 5272.3
                                        A_2
                                                5273 3578.414 2417.786
## 1714 4238.77 6356.1 2988.6 5253.1
                                        A_2
                                                5253 3568.914 2408.286
## 1715 4222.16 6391.0 2966.2 5181.4
                                        A_2
                                                5181 3546.514 2385.886
## 1716 4266.34 6411.0 3000.5 5237.2
                                        A_2
                                                5237 3580.814 2420.186
                                                5327 3632.314 2471.686
## 1717 4316.05 6424.0 3052.0 5326.3
                                        A_2
## 1718 4385.29 6508.7 3088.3 5372.6
                                        A_2
                                                5373 3668.614 2507.986
## 1719 4444.53 6530.4 3133.8 5422.4
                                        A_2
                                                5423 3714.114 2553.486
## 1720 4442.53 6582.6 3172.1 5458.5
                                        A_2
                                                5459 3752.414 2591.786
## 1721 4529.88 6688.0 3187.5 5599.0
                                        A_2
                                                5599 3767.814 2607.186
                                        A_2
## 1722 4529.18 6720.7 3188.4 5612.8
                                                5613 3768.714 2608.086
                                        A_2
## 1723 4509.25 6708.9 3166.3 5595.8
                                                5595 3746.614 2585.986
## 1724 4494.72 6772.0 3189.6 5606.4
                                        A_2
                                                 5607 3769.914 2609.286
## 1725 4536.91 6857.1 3216.7 5629.7
                                        A_2
                                                5629 3797.014 2636.386
## 1726 4519.56 6828.4 3220.9 5600.9
                                        A_2
                                                 5601 3801.214 2640.586
                                        A_2
## 1727 4558.62 6860.8 3235.8 5613.3
                                                5613 3816.114 2655.486
## 1728 4552.46 6931.6 3240.0 5607.9
                                        A_2
                                                5607 3820.314 2659.686
## 1729 4509.37 6856.0 3178.7 5552.5
                                        A_2
                                                5553 3759.014 2598.386
## 1730 4522.42 6898.9 3187.7 5582.3
                                        A_2
                                                5583 3768.014 2607.386
                                        A_2
## 1731 4535.56 6905.3 3225.1 5619.9
                                                5619 3805.414 2644.786
                                                5709 3860.814 2700.186
## 1732 4627.42 6990.5 3280.5 5709.5
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## 1733 4611.66 6966.2 3281.7 5723.4
                                        A_2
                                                5723 3862.014 2701.386
                                                5719 3830.914 2670.286
## 1734 4581.08 6953.2 3250.6 5718.5
                                        A_2
## 1735 4583.03 6986.7 3262.5 5718.5
                                        A 2
                                                5719 3842.814 2682.186
## 1736 4610.66 6986.1 3273.5 5702.8
                                        A_2
                                                5703 3853.814 2693.186
## 1737 4604.55 6945.0 3262.3 5651.0
                                        A_2
                                                 5651 3842.614 2681.986
## 1738 4704.58 7065.4 3348.2 5745.1
                                        A_2
                                                5745 3928.514 2767.886
## 1739 4695.78 7118.6 3397.0 5764.8
                                                5765 3977.314 2816.686
                                        A 2
## 1740 4693.86 7153.1 3421.9 5767.3
                                        A_2
                                                5767 4002.214 2841.586
## 1741 4781.62 7273.0 3446.7 5820.6
                                        A_2
                                                5821 4027.014 2866.386
## 1742 4759.62 7259.5 3414.9 5807.7
                                        A_2
                                                5807 3995.214 2834.586
## 1743 4690.52 7130.5 3381.3 5733.1
                                        A_2
                                                 5733 3961.614 2800.986
## 1744 4676.42 7077.3 3395.8 5695.6
                                        A_2
                                                5695 3976.114 2815.486
## 1745 4762.71 7197.2 3483.2 5782.9
                                        A_2
                                                 5783 4063.514 2902.886
## 1746 4828.89 7187.5 3525.9 5818.9
                                        A_2
                                                5819 4106.214 2945.586
## 1747 4852.22 7246.5 3521.5 5828.5
                                        A_2
                                                 5829 4101.814 2941.186
## 1748 4862.41 7276.7 3539.4 5829.8
                                        A_2
                                                5829 4119.714 2959.086
                                                5795 4106.914 2946.286
## 1749 4838.67 7267.9 3526.6 5794.8
                                        A_2
## 1750 4872.24 7328.0 3540.2 5782.3
                                        A_2
                                                5783 4120.514 2959.886
## 1751 4905.59 7261.2 3598.3 5785.1
                                        A_2
                                                5785 4178.614 3017.986
## 1752 4945.91 7236.5 3661.3 5834.9
                                        A 2
                                                 5835 4241.614 3080.986
```

```
## 1753 4908.55 7132.4 3652.5 5903.6
                                         A_2
                                                 5903 4232.814 3072.186
                                                 5997 4269.014 3108.386
## 1754 4949.91 7143.8 3688.7 5997.9
                                         A_2
## 1755 5045.16 7300.5 3688.9 5956.3
                                         A_2
                                                 5957 4269.214 3108.586
## 1756 5014.13 7341.0 3680.1 5947.0
                                         A_2
                                                 5947 4260.414 3099.786
## 1757 5064.35 7407.4 3738.5 5983.7
                                         A_2
                                                 5983 4318.814 3158.186
## 1758 5114.13 7472.1 3818.7 5967.8
                                         A 2
                                                 5967 4399.014 3238.386
## 1759 5029.00 7415.9 3783.8 5905.6
                                                 5905 4364.114 3203.486
                                        A 2
                                         A_2
## 1760 5066.90 7530.3 3810.2 5939.3
                                                 5939 4390.514 3229.886
## 1761 5069.89 7536.3 3800.2 5911.9
                                         A_2
                                                 5911 4380.514 3219.886
## 1762 5097.25 7585.5 3875.3 5932.2
                                         A_2
                                                 5933 4455.614 3294.986
## 1763 5135.35 7615.5 3883.3 6017.6
                                         A_2
                                                 6017 4463.614 3302.986
                                         A_2
## 1764 5179.04 7638.8 3935.9 6052.8
                                                 6053 4516.214 3355.586
## 1765 5254.32 7725.9 3932.0 6064.2
                                         A_2
                                                 6065 4512.314 3351.686
## 1766 5345.89 7827.7 3986.8 6105.8
                                         A_2
                                                 6105 4567.114 3406.486
## 1767 5309.67 7744.3 3903.3 6094.0
                                         A_2
                                                 6095 4483.614 3322.986
## 1768 5267.35 7588.1 3873.9 6055.2
                                         A_2
                                                 6055 4454.214 3293.586
## 1769 5312.25 7624.1 3894.5 6105.5
                                         A_2
                                                 6105 4474.814 3314.186
## 1770 5312.25 7624.1 3894.5 6105.5
                                         A_2
                                                 6105 4474.814 3314.186
                                                 6105 4474.814 3314.186
## 1771 5312.25 7624.1 3894.5 6105.5
                                        A_2
## 1772 5367.98 7662.9 3867.7 6104.1
                                        A_2
                                                 6105 4448.014 3287.386
## 1773 5359.24 7616.3 3884.6 6074.1
                                        A_2
                                                 6075 4464.914 3304.286
## 1774 5292.97 7500.1 3845.9 6002.0
                                        A_2
                                                 6003 4426.214 3265.586
## 1775 5326.63 7453.7 3861.6 5922.2
                                         A_2
                                                 5923 4441.914 3281.286
## 1776 5407.93 7500.1 3885.7 5954.1
                                        A_2
                                                 5955 4466.014 3305.386
                                         A_2
## 1777 5373.80 7369.1 3860.4 5955.0
                                                 5955 4440.714 3280.086
## 1778 5312.28 7308.9 3835.1 5931.1
                                         A_2
                                                 5931 4415.414 3254.786
## 1779 5262.57 7265.5 3822.1 5898.1
                                         A_2
                                                 5899 4402.414 3241.786
## 1780 5144.42 7232.3 3788.7 5863.9
                                         A_2
                                                 5863 4369.014 3208.386
                                         A_2
## 1781 5002.71 7053.5 3689.4 5722.4
                                                 5723 4269.714 3109.086
## 1782 5110.88 7180.1 3777.2 5806.6
                                        A_2
                                                 5807 4357.514 3196.886
## 1783 5083.80 7241.8 3726.2 5833.1
                                         A_2
                                                 5833 4306.514 3145.886
## 1784 5241.23 7401.4 3867.9 5928.3
                                         A_2
                                                 5929 4448.214 3287.586
                                         A_2
## 1785 5241.23 7401.4 3867.9 6011.3
                                                 6011 4448.214 3287.586
## 1786 5337.75 7640.8 3979.3 6011.3
                                         A_2
                                                 6011 4559.614 3398.986
## 1787 5226.20 7596.2 3945.5 5986.5
                                         A_2
                                                 5987 4525.814 3365.186
## 1788 5264.62 7610.8 3947.5 5992.4
                                                 5993 4527.814 3367.186
                                        A_2
## 1789 5164.89 7536.0 3912.8 5938.0
                                        A_2
                                                5939 4493.114 3332.486
## 1790 5270.61 7587.1 3912.8 5969.8
                                         A_2
                                                 5969 4493.114 3332.486
## 1791 5348.75 7677.5 4007.3 6028.3
                                        A_2
                                                 6029 4587.614 3426.986
## 1792 5307.82 7627.3 3986.1 5956.7
                                         A_2
                                                 5957 4566.414 3405.786
                                         A_2
## 1793 5371.99 7582.8 4018.5 5972.9
                                                 5973 4598.814 3438.186
## 1794 5374.11 7550.6 4012.0 5948.5
                                         A_2
                                                 5949 4592.314 3431.686
## 1795 5414.31 7519.4 3990.2 5917.8
                                         A_2
                                                 5917 4570.514 3409.886
## 1796 5343.66 7371.4 3945.3 5826.2
                                         A_2
                                                 5827 4525.614 3364.986
## 1797 5441.00 7483.2 3980.8 5877.8
                                         A_2
                                                 5877 4561.114 3400.486
## 1798 5514.51 7495.8 4047.9 5907.4
                                         A_2
                                                 5907 4628.214 3467.586
## 1799 5514.51 7495.8 4047.9 5935.6
                                         A_2
                                                 5935 4628.214 3467.586
## 1800 5530.19 7542.7 4049.8 5955.6
                                         A_2
                                                 5955 4630.114 3469.486
## 1801 5592.46 7657.1 4108.7 5955.6
                                         A_2
                                                 5955 4689.014 3528.386
                                         A_2
## 1802 5639.89 7731.9 4115.9 5970.7
                                                 5971 4696.214 3535.586
## 1803 5466.88 7633.5 4017.4 5870.2
                                                 5871 4597.714 3437.086
                                         A_2
## 1804 5507.36 7605.0 4014.9 5862.3
                                        A_2
                                                 5863 4595.214 3434.586
## 1805 5556.99 7656.1 4041.2 5870.7
                                        A_2
                                                 5871 4621.514 3460.886
## 1806 5556.99 7656.1 4041.2 5837.9
                                         A 2
                                                 5837 4621.514 3460.886
```

```
## 1807 5583.83 7657.5 4087.0 5842.3
                                         A_2
                                                 5843 4667.314 3506.686
## 1808 5640.42 7676.3 4149.4 5898.4
                                                 5899 4729.714 3569.086
                                         A_2
## 1809 5605.38 7592.9 4119.0 5860.8
                                         A_2
                                                 5861 4699.314 3538.686
## 1810 5724.75 7699.5 4185.1 5947.3
                                         A_2
                                                 5947 4765.414 3604.786
## 1811 5787.05 7743.4 4204.6 6037.8
                                         A_2
                                                 6037 4784.914 3624.286
## 1812 5773.77 7716.8 4201.9 6019.8
                                         A 2
                                                 6019 4782.214 3621.586
## 1813 5799.22 7652.6 4208.6 5987.4
                                                 5987 4788.914 3628.286
                                         A 2
## 1814 5799.22 7498.4 4141.6 5852.5
                                         A 2
                                                 5853 4721.914 3561.286
## 1815 5631.34 7417.4 4050.8 5769.8
                                         A_2
                                                 5769 4631.114 3470.486
## 1816 5581.24 7342.7 4005.3 5715.7
                                         A_2
                                                 5715 4585.614 3424.986
## 1817 5621.71 7388.7 4013.3 5729.7
                                         A_2
                                                 5729 4593.614 3432.986
                                         A_2
## 1818 5742.83 7562.7 4092.9 5832.7
                                                 5833 4673.214 3512.586
## 1819 5689.89 7488.0 4052.3 5812.1
                                         A_2
                                                 5813 4632.614 3471.986
## 1820 5644.22 7518.6 4027.3 5748.1
                                         A_2
                                                 5749 4607.614 3446.986
## 1821 5648.11 7511.8 4018.6 5712.4
                                         A_2
                                                 5713 4598.914 3438.286
## 1822 5748.34 7624.8 4065.0 5772.0
                                         A_2
                                                 5773 4645.314 3484.686
## 1823 5784.40 7667.9 4126.3 5804.9
                                         A_2
                                                 5805 4706.614 3545.986
## 1824 5886.72 7794.7 4203.8 5858.9
                                         A_2
                                                 5859 4784.114 3623.486
## 1825 5870.49 7816.9 4215.7 5877.4
                                                 5877 4796.014 3635.386
                                         A_2
## 1826 5933.73 7881.9 4248.2 5884.5
                                         A_2
                                                 5885 4828.514 3667.886
## 1827 5841.83 7882.0 4203.5 5832.5
                                         A_2
                                                 5833 4783.814 3623.186
## 1828 5910.51 8038.2 4260.7 5919.9
                                         A_2
                                                 5919 4841.014 3680.386
## 1829 5905.15 8047.3 4252.1 5960.2
                                         A_2
                                                 5961 4832.414 3671.786
## 1830 5961.45 8099.0 4304.4 5988.4
                                         A_2
                                                 5989 4884.714 3724.086
                                         A_2
## 1831 5942.06 8166.0 4311.1 5990.3
                                                 5991 4891.414 3730.786
## 1832 5975.88 8160.0 4333.1 6003.4
                                         A_2
                                                 6003 4913.414 3752.786
## 1833 6018.89 8227.2 4339.9 6009.6
                                         A_2
                                                 6009 4920.214 3759.586
## 1834 6000.84 8205.0 4319.2 5969.7
                                         A_2
                                                 5969 4899.514 3738.886
                                         A_2
## 1835 6001.24 8192.4 4256.4 5927.9
                                                 5927 4836.714 3676.086
## 1836 6023.31 8141.9 4256.4 5958.2
                                         A_2
                                                 5959 4836.714 3676.086
## 1837 6101.90 8180.5 4256.4 6100.2
                                         A_2
                                                 6101 4836.714 3676.086
## 1838 6106.10 8158.1 4344.3 6151.5
                                         A_2
                                                 6151 4924.614 3763.986
                                         A_2
## 1839 6108.00 8126.5 4358.1 6116.8
                                                 6117 4938.414 3777.786
## 1840 6162.86 8288.2 4388.5 6174.0
                                         A_2
                                                 6175 4968.814 3808.186
## 1841 6186.09 8400.8 4368.9 6179.0
                                         A_2
                                                 6179 4949.214 3788.586
## 1842 6184.10 8412.0 4322.1 6132.7
                                                 6133 4902.414 3741.786
                                         A_2
## 1843 6081.11 8340.7 4220.1 5989.6
                                         A 2
                                                 5989 4800.414 3639.786
## 1844 6043.82 8229.2 4235.9 5976.2
                                         A_2
                                                 5977 4816.214 3655.586
## 1845 6040.58 8205.7 4205.4 5892.3
                                         A_2
                                                 5893 4785.714 3625.086
## 1846 5854.35 7998.7 4139.5 5836.1
                                         A_2
                                                 5837 4719.814 3559.186
## 1847 5867.52 8093.0 4122.4 5835.8
                                                 5835 4702.714 3542.086
                                         A_2
## 1848 5828.74 8102.7 4139.2 5844.1
                                         A_2
                                                 5845 4719.514 3558.886
## 1849 5906.33 8205.5 4197.6 5910.7
                                         A_2
                                                 5911 4777.914 3617.286
## 1850 5861.19 8239.5 4177.3 5837.0
                                         A_2
                                                 5837 4757.614 3596.986
## 1851 5774.38 8139.2 4095.0 5809.7
                                         A_2
                                                 5809 4675.314 3514.686
                                         A_2
## 1852 5718.70 8170.2 4047.9 5736.1
                                                 5737 4628.214 3467.586
## 1853 5614.77 7943.2 3976.4 5632.5
                                         A_2
                                                 5633 4556.714 3396.086
## 1854 5528.12 7846.2 3968.6 5594.1
                                         A_2
                                                 5595 4548.914 3388.286
## 1855 5598.32 7952.9 4041.9 5680.4
                                         A_2
                                                 5681 4622.214 3461.586
## 1856 5460.43 7721.3 3939.5 5587.6
                                         A_2
                                                 5587 4519.814 3359.186
## 1857 5285.78 7447.9 3846.0 5432.8
                                                 5433 4426.314 3265.686
                                         A_2
## 1858 5386.94 7607.5 3945.7 5462.2
                                         A_2
                                                 5463 4526.014 3365.386
## 1859 5355.03 7552.6 3951.7 5399.5
                                         A_2
                                                 5399 4532.014 3371.386
## 1860 5473.72 7676.3 3995.0 5455.0
                                         A 2
                                                 5455 4575.314 3414.686
```

8. Create a column that stores the final opening value as average of column OP1 and OP2.

```
eustock$FinalOP <- c((OP1 + OP2)/2)
eustock</pre>
```

```
##
                    SMI
                           CAC
                                 FTSE CAT_DAX CAT_FTSE
                                                             OP1
                                                                       OP2 FinalOP
            DAX
## 1
        1628.75 1678.1 1772.8 2443.6
                                           A 1
                                                   2443 2353.114 1192.486
                                                                            1772.8
## 2
        1613.63 1688.5 1750.5 2460.2
                                                   2459 2330.814 1170.186
                                           A_1
                                                                            1750.5
## 3
        1606.51 1678.6 1718.0 2448.2
                                           A_1
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## 1731 4535.56 6905.3 3225.1 5619.9
                                         A_2
                                                 5619 3805.414 2644.786
                                                                         3225.1
## 1732 4627.42 6990.5 3280.5 5709.5
                                         A_2
                                                 5709 3860.814 2700.186
                                                                         3280.5
## 1733 4611.66 6966.2 3281.7 5723.4
                                         A_2
                                                 5723 3862.014 2701.386
                                                                         3281.7
                                         A_2
## 1734 4581.08 6953.2 3250.6 5718.5
                                                 5719 3830.914 2670.286
                                                                         3250.6
## 1735 4583.03 6986.7 3262.5 5718.5
                                         A_2
                                                 5719 3842.814 2682.186
                                                                         3262.5
                                         A_2
                                                 5703 3853.814 2693.186
## 1736 4610.66 6986.1 3273.5 5702.8
                                                                         3273.5
## 1737 4604.55 6945.0 3262.3 5651.0
                                         A_2
                                                 5651 3842.614 2681.986
                                                                         3262.3
## 1738 4704.58 7065.4 3348.2 5745.1
                                         A_2
                                                 5745 3928.514 2767.886
                                                                         3348.2
## 1739 4695.78 7118.6 3397.0 5764.8
                                         A_2
                                                 5765 3977.314 2816.686
                                                                         3397.0
## 1740 4693.86 7153.1 3421.9 5767.3
                                         A_2
                                                 5767 4002.214 2841.586
## 1741 4781.62 7273.0 3446.7 5820.6
                                         A_2
                                                 5821 4027.014 2866.386
                                                                         3446.7
## 1742 4759.62 7259.5 3414.9 5807.7
                                         A_2
                                                 5807 3995.214 2834.586
                                                                         3414.9
## 1743 4690.52 7130.5 3381.3 5733.1
                                         A_2
                                                 5733 3961.614 2800.986
                                                                         3381.3
## 1744 4676.42 7077.3 3395.8 5695.6
                                         A_2
                                                 5695 3976.114 2815.486
## 1745 4762.71 7197.2 3483.2 5782.9
                                         A_2
                                                5783 4063.514 2902.886
                                                                         3483.2
## 1746 4828.89 7187.5 3525.9 5818.9
                                         A 2
                                                 5819 4106.214 2945.586
                                                                         3525.9
## 1747 4852.22 7246.5 3521.5 5828.5
                                                 5829 4101.814 2941.186
                                         A_2
                                                                         3521.5
## 1748 4862.41 7276.7 3539.4 5829.8
                                         A_2
                                                 5829 4119.714 2959.086
                                                                         3539.4
## 1749 4838.67 7267.9 3526.6 5794.8
                                         A_2
                                                 5795 4106.914 2946.286
                                                                         3526.6
## 1750 4872.24 7328.0 3540.2 5782.3
                                         A_2
                                                 5783 4120.514 2959.886
                                                                         3540.2
                                         A_2
## 1751 4905.59 7261.2 3598.3 5785.1
                                                 5785 4178.614 3017.986
                                                                         3598.3
## 1752 4945.91 7236.5 3661.3 5834.9
                                         A_2
                                                 5835 4241.614 3080.986
                                                                         3661.3
## 1753 4908.55 7132.4 3652.5 5903.6
                                         A_2
                                                 5903 4232.814 3072.186
                                                                         3652.5
## 1754 4949.91 7143.8 3688.7 5997.9
                                         A_2
                                                 5997 4269.014 3108.386
                                                                         3688.7
## 1755 5045.16 7300.5 3688.9 5956.3
                                         A_2
                                                 5957 4269.214 3108.586
                                                                         3688.9
## 1756 5014.13 7341.0 3680.1 5947.0
                                         A_2
                                                 5947 4260.414 3099.786
                                                                         3680.1
## 1757 5064.35 7407.4 3738.5 5983.7
                                         A_2
                                                 5983 4318.814 3158.186
                                                                         3738.5
## 1758 5114.13 7472.1 3818.7 5967.8
                                                 5967 4399.014 3238.386
                                         A_2
                                                                         3818.7
## 1759 5029.00 7415.9 3783.8 5905.6
                                         A 2
                                                5905 4364.114 3203.486
## 1760 5066.90 7530.3 3810.2 5939.3
                                         A_2
                                                5939 4390.514 3229.886
                                                                         3810.2
## 1761 5069.89 7536.3 3800.2 5911.9
                                         A_2
                                                 5911 4380.514 3219.886
                                                                         3800.2
## 1762 5097.25 7585.5 3875.3 5932.2
                                         A_2
                                                 5933 4455.614 3294.986
                                                                         3875.3
## 1763 5135.35 7615.5 3883.3 6017.6
                                                 6017 4463.614 3302.986
                                         A 2
                                                                         3883.3
## 1764 5179.04 7638.8 3935.9 6052.8
                                         A_2
                                                 6053 4516.214 3355.586
                                                                         3935.9
## 1765 5254.32 7725.9 3932.0 6064.2
                                         A_2
                                                 6065 4512.314 3351.686
                                                                         3932.0
## 1766 5345.89 7827.7 3986.8 6105.8
                                         A_2
                                                 6105 4567.114 3406.486
                                                                         3986.8
## 1767 5309.67 7744.3 3903.3 6094.0
                                         A_2
                                                 6095 4483.614 3322.986
                                                                         3903.3
## 1768 5267.35 7588.1 3873.9 6055.2
                                         A_2
                                                 6055 4454.214 3293.586
                                                                         3873.9
## 1769 5312.25 7624.1 3894.5 6105.5
                                         A_2
                                                 6105 4474.814 3314.186
                                                                         3894.5
## 1770 5312.25 7624.1 3894.5 6105.5
                                         A_2
                                                 6105 4474.814 3314.186
                                                                         3894.5
## 1771 5312.25 7624.1 3894.5 6105.5
                                         A_2
                                                 6105 4474.814 3314.186
                                                                         3894.5
## 1772 5367.98 7662.9 3867.7 6104.1
                                         A_2
                                                 6105 4448.014 3287.386
                                                                         3867.7
## 1773 5359.24 7616.3 3884.6 6074.1
                                                 6075 4464.914 3304.286
                                         A_2
                                                                         3884.6
## 1774 5292.97 7500.1 3845.9 6002.0
                                         A_2
                                                 6003 4426.214 3265.586
                                                                         3845.9
## 1775 5326.63 7453.7 3861.6 5922.2
                                         A_2
                                                 5923 4441.914 3281.286
                                                                         3861.6
## 1776 5407.93 7500.1 3885.7 5954.1
                                         A 2
                                                 5955 4466.014 3305.386
                                                                         3885.7
```

```
## 1777 5373.80 7369.1 3860.4 5955.0
                                        A_2
                                                5955 4440.714 3280.086
## 1778 5312.28 7308.9 3835.1 5931.1
                                                5931 4415.414 3254.786
                                        A_2
                                                                       3835.1
## 1779 5262.57 7265.5 3822.1 5898.1
                                        A_2
                                                5899 4402.414 3241.786
## 1780 5144.42 7232.3 3788.7 5863.9
                                        A_2
                                                5863 4369.014 3208.386
                                                                       3788.7
## 1781 5002.71 7053.5 3689.4 5722.4
                                        A_2
                                                5723 4269.714 3109.086
                                                                       3689.4
## 1782 5110.88 7180.1 3777.2 5806.6
                                        A 2
                                               5807 4357.514 3196.886
                                                                       3777.2
## 1783 5083.80 7241.8 3726.2 5833.1
                                       A 2
                                                5833 4306.514 3145.886
                                       A_2
## 1784 5241.23 7401.4 3867.9 5928.3
                                               5929 4448.214 3287.586
                                                                       3867.9
## 1785 5241.23 7401.4 3867.9 6011.3
                                        A_2
                                                6011 4448.214 3287.586
                                                                       3867.9
## 1786 5337.75 7640.8 3979.3 6011.3
                                        A_2
                                                6011 4559.614 3398.986
                                                                       3979.3
## 1787 5226.20 7596.2 3945.5 5986.5
                                        A_2
                                                5987 4525.814 3365.186
                                                                       3945.5
## 1788 5264.62 7610.8 3947.5 5992.4
                                        A_2
                                                5993 4527.814 3367.186
                                                                       3947.5
## 1789 5164.89 7536.0 3912.8 5938.0
                                        A_2
                                               5939 4493.114 3332.486
                                                                       3912.8
## 1790 5270.61 7587.1 3912.8 5969.8
                                       A_2
                                               5969 4493.114 3332.486
                                                                       3912.8
## 1791 5348.75 7677.5 4007.3 6028.3
                                       A_2
                                               6029 4587.614 3426.986
                                                                       4007.3
## 1792 5307.82 7627.3 3986.1 5956.7
                                       A_2
                                               5957 4566.414 3405.786
                                                                       3986.1
## 1793 5371.99 7582.8 4018.5 5972.9
                                       A_2
                                               5973 4598.814 3438.186
                                                                       4018.5
## 1794 5374.11 7550.6 4012.0 5948.5
                                        A_2
                                               5949 4592.314 3431.686
## 1795 5414.31 7519.4 3990.2 5917.8
                                        A_2
                                               5917 4570.514 3409.886
                                                                       3990.2
## 1796 5343.66 7371.4 3945.3 5826.2
                                        A_2
                                               5827 4525.614 3364.986
                                                                       3945.3
## 1797 5441.00 7483.2 3980.8 5877.8
                                        A_2
                                               5877 4561.114 3400.486
                                                                       3980.8
## 1798 5514.51 7495.8 4047.9 5907.4
                                       A_2
                                                5907 4628.214 3467.586
## 1799 5514.51 7495.8 4047.9 5935.6
                                        A_2
                                               5935 4628.214 3467.586
                                                                       4047.9
## 1800 5530.19 7542.7 4049.8 5955.6
                                       A 2
                                                5955 4630.114 3469.486
                                                                       4049.8
                                        A_2
## 1801 5592.46 7657.1 4108.7 5955.6
                                                5955 4689.014 3528.386
                                                                       4108.7
## 1802 5639.89 7731.9 4115.9 5970.7
                                        A_2
                                                5971 4696.214 3535.586
                                                                       4115.9
## 1803 5466.88 7633.5 4017.4 5870.2
                                        A_2
                                                5871 4597.714 3437.086
                                                                       4017.4
## 1804 5507.36 7605.0 4014.9 5862.3
                                        A_2
                                                5863 4595.214 3434.586
                                                                       4014.9
                                       A_2
## 1805 5556.99 7656.1 4041.2 5870.7
                                                5871 4621.514 3460.886
                                                                       4041.2
## 1806 5556.99 7656.1 4041.2 5837.9
                                      A_2
                                               5837 4621.514 3460.886
                                                                       4041.2
## 1807 5583.83 7657.5 4087.0 5842.3
                                       A_2
                                               5843 4667.314 3506.686
                                                                       4087.0
## 1808 5640.42 7676.3 4149.4 5898.4
                                       A_2
                                                5899 4729.714 3569.086
                                                                       4149.4
                                        A_2
## 1809 5605.38 7592.9 4119.0 5860.8
                                                5861 4699.314 3538.686
                                                                       4119.0
## 1810 5724.75 7699.5 4185.1 5947.3
                                        A_2
                                               5947 4765.414 3604.786
                                                                       4185.1
## 1811 5787.05 7743.4 4204.6 6037.8
                                        A_2
                                                6037 4784.914 3624.286
                                                                       4204.6
## 1812 5773.77 7716.8 4201.9 6019.8
                                       A_2
                                                6019 4782.214 3621.586
                                                                       4201.9
## 1813 5799.22 7652.6 4208.6 5987.4
                                       A 2
                                               5987 4788.914 3628.286
## 1814 5799.22 7498.4 4141.6 5852.5
                                        A_2
                                               5853 4721.914 3561.286
                                                                       4141.6
## 1815 5631.34 7417.4 4050.8 5769.8
                                       A_2
                                                5769 4631.114 3470.486
                                                                       4050.8
## 1816 5581.24 7342.7 4005.3 5715.7
                                        A_2
                                               5715 4585.614 3424.986
                                                                       4005.3
## 1817 5621.71 7388.7 4013.3 5729.7
                                        A 2
                                                5729 4593.614 3432.986
## 1818 5742.83 7562.7 4092.9 5832.7
                                        A_2
                                                5833 4673.214 3512.586
                                                                       4092.9
## 1819 5689.89 7488.0 4052.3 5812.1
                                        A_2
                                                5813 4632.614 3471.986
                                                                       4052.3
## 1820 5644.22 7518.6 4027.3 5748.1
                                        A_2
                                               5749 4607.614 3446.986
                                                                       4027.3
## 1821 5648.11 7511.8 4018.6 5712.4
                                                5713 4598.914 3438.286
                                        A_2
                                                                       4018.6
## 1822 5748.34 7624.8 4065.0 5772.0
                                        A_2
                                               5773 4645.314 3484.686
                                                                       4065.0
## 1823 5784.40 7667.9 4126.3 5804.9
                                        A_2
                                                5805 4706.614 3545.986
                                                                       4126.3
## 1824 5886.72 7794.7 4203.8 5858.9
                                        A_2
                                                5859 4784.114 3623.486
                                                                       4203.8
## 1825 5870.49 7816.9 4215.7 5877.4
                                        A_2
                                                5877 4796.014 3635.386
                                                                      4215.7
                                        A_2
## 1826 5933.73 7881.9 4248.2 5884.5
                                                5885 4828.514 3667.886
                                                                       4248.2
## 1827 5841.83 7882.0 4203.5 5832.5
                                                5833 4783.814 3623.186
                                        A_2
                                                                       4203.5
## 1828 5910.51 8038.2 4260.7 5919.9
                                       A_2
                                               5919 4841.014 3680.386
## 1829 5905.15 8047.3 4252.1 5960.2
                                       A_2
                                               5961 4832.414 3671.786 4252.1
## 1830 5961.45 8099.0 4304.4 5988.4
                                        A 2
                                                5989 4884.714 3724.086 4304.4
```

```
## 1831 5942.06 8166.0 4311.1 5990.3
                                          A_2
                                                  5991 4891.414 3730.786
## 1832 5975.88 8160.0 4333.1 6003.4
                                                  6003 4913.414 3752.786
                                          A_2
                                                                          4333.1
## 1833 6018.89 8227.2 4339.9 6009.6
                                          A_2
                                                  6009 4920.214 3759.586
                                                                          4339.9
## 1834 6000.84 8205.0 4319.2 5969.7
                                                  5969 4899.514 3738.886
                                          A_2
                                                                          4319.2
## 1835 6001.24 8192.4 4256.4 5927.9
                                         A_2
                                                  5927 4836.714 3676.086
                                                                          4256.4
## 1836 6023.31 8141.9 4256.4 5958.2
                                                  5959 4836.714 3676.086
                                          A 2
                                                                          4256.4
## 1837 6101.90 8180.5 4256.4 6100.2
                                          A 2
                                                  6101 4836.714 3676.086
                                                                          4256.4
## 1838 6106.10 8158.1 4344.3 6151.5
                                         A_2
                                                  6151 4924.614 3763.986
                                                                          4344.3
## 1839 6108.00 8126.5 4358.1 6116.8
                                          A_2
                                                  6117 4938.414 3777.786
                                                                          4358.1
## 1840 6162.86 8288.2 4388.5 6174.0
                                          A_2
                                                  6175 4968.814 3808.186
                                                                          4388.5
## 1841 6186.09 8400.8 4368.9 6179.0
                                          A_2
                                                  6179 4949.214 3788.586
                                                                          4368.9
## 1842 6184.10 8412.0 4322.1 6132.7
                                          A_2
                                                  6133 4902.414 3741.786
                                                                          4322.1
## 1843 6081.11 8340.7 4220.1 5989.6
                                          A_2
                                                  5989 4800.414 3639.786
                                                                          4220.1
## 1844 6043.82 8229.2 4235.9 5976.2
                                          A_2
                                                                          4235.9
                                                  5977 4816.214 3655.586
## 1845 6040.58 8205.7 4205.4 5892.3
                                          A_2
                                                  5893 4785.714 3625.086
                                                                          4205.4
## 1846 5854.35 7998.7 4139.5 5836.1
                                          A_2
                                                  5837 4719.814 3559.186
                                                                          4139.5
## 1847 5867.52 8093.0 4122.4 5835.8
                                          A_2
                                                  5835 4702.714 3542.086
                                                                          4122.4
## 1848 5828.74 8102.7 4139.2 5844.1
                                          A_2
                                                  5845 4719.514 3558.886
## 1849 5906.33 8205.5 4197.6 5910.7
                                                  5911 4777.914 3617.286
                                          A_2
                                                                          4197.6
## 1850 5861.19 8239.5 4177.3 5837.0
                                          A_2
                                                  5837 4757.614 3596.986
                                                                          4177.3
## 1851 5774.38 8139.2 4095.0 5809.7
                                          A_2
                                                  5809 4675.314 3514.686
                                                                          4095.0
## 1852 5718.70 8170.2 4047.9 5736.1
                                          A_2
                                                  5737 4628.214 3467.586
                                                                          4047.9
## 1853 5614.77 7943.2 3976.4 5632.5
                                                  5633 4556.714 3396.086
                                          A_2
                                                                          3976.4
## 1854 5528.12 7846.2 3968.6 5594.1
                                          A_2
                                                  5595 4548.914 3388.286
                                                                          3968.6
## 1855 5598.32 7952.9 4041.9 5680.4
                                          A_2
                                                  5681 4622.214 3461.586
                                                                          4041.9
## 1856 5460.43 7721.3 3939.5 5587.6
                                          A_2
                                                  5587 4519.814 3359.186
                                                                          3939.5
## 1857 5285.78 7447.9 3846.0 5432.8
                                          A_2
                                                  5433 4426.314 3265.686
                                                                          3846.0
## 1858 5386.94 7607.5 3945.7 5462.2
                                          A_2
                                                  5463 4526.014 3365.386
                                                                          3945.7
## 1859 5355.03 7552.6 3951.7 5399.5
                                                  5399 4532.014 3371.386
                                          A_2
                                                                          3951.7
## 1860 5473.72 7676.3 3995.0 5455.0
                                          A_2
                                                  5455 4575.314 3414.686
                                                                          3995.0
```

9. Use a while loop to iterate through the FTSE column to find the second largest value of FTSE.

```
count <- 1
largest <- 0

while (count <= length(eustock$FTSE))
    {
    if(eustock$FTSE[count] > largest){
        largest2 <- largest
        largest <- eustock$FTSE[count] }

    count = count + 1
}

paste("Second Largest value:", largest2)</pre>
```

[1] "Second Largest value: 6174"

```
#To make sure that both the values match
# Second highest value in the FTSE column
cat("\n")
```

max(eustock\$FTSE[eustock\$FTSE != max(eustock\$FTSE)])

[1] 6174