

assignment_8.2_VenkidusamyKesavAdithya

Kesav Adithya Venkidusamy

10/24/2021

Work individually on this assignment. You are encouraged to collaborate on ideas and strategies pertinent to this assignment. Data for this assignment is focused on real estate transactions recorded from 1964 to 2016 and can be found in `Housing.xlsx`. Using your skills in statistical correlation, multiple regression, and R programming, you are interested in the following variables: Sale Price and several other possible predictors.

```
#Question a
#If you worked with the Housing dataset in previous week - you are in luck, you likely have already fou

#Load required libraries for analysis
library(ggplot2)
library(dplyr)

## 
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
## 
##     filter, lag

## The following objects are masked from 'package:base':
## 
##     intersect, setdiff, setequal, union

library(pastecs)

## 
## Attaching package: 'pastecs'

## The following objects are masked from 'package:dplyr':
## 
##     first, last
```

```

library("readxl")

#Create data frame for the input survey file
raw_housing_df <- read_excel("E:/Personal/Bellevue University/Course/github/dsc520/data/week-7-housing.xlsx")

#print column and row names
print(attributes(raw_housing_df))

```

```

## $class
## [1] "tbl_df"     "tbl"        "data.frame"
##
## $row.names
##    [1]   1   2   3   4   5   6   7   8   9   10  11  12
##   [13]  13  14  15  16  17  18  19  20  21  22  23  24
##   [25]  25  26  27  28  29  30  31  32  33  34  35  36
##   [37]  37  38  39  40  41  42  43  44  45  46  47  48
##   [49]  49  50  51  52  53  54  55  56  57  58  59  60
##   [61]  61  62  63  64  65  66  67  68  69  70  71  72
##   [73]  73  74  75  76  77  78  79  80  81  82  83  84
##   [85]  85  86  87  88  89  90  91  92  93  94  95  96
##   [97]  97  98  99  100 101 102 103 104 105 106 107 108
##  [109] 109 110 111 112 113 114 115 116 117 118 119 120
##  [121] 121 122 123 124 125 126 127 128 129 130 131 132
##  [133] 133 134 135 136 137 138 139 140 141 142 143 144
##  [145] 145 146 147 148 149 150 151 152 153 154 155 156
##  [157] 157 158 159 160 161 162 163 164 165 166 167 168
##  [169] 169 170 171 172 173 174 175 176 177 178 179 180
##  [181] 181 182 183 184 185 186 187 188 189 190 191 192
##  [193] 193 194 195 196 197 198 199 200 201 202 203 204
##  [205] 205 206 207 208 209 210 211 212 213 214 215 216
##  [217] 217 218 219 220 221 222 223 224 225 226 227 228
##  [229] 229 230 231 232 233 234 235 236 237 238 239 240
##  [241] 241 242 243 244 245 246 247 248 249 250 251 252
##  [253] 253 254 255 256 257 258 259 260 261 262 263 264
##  [265] 265 266 267 268 269 270 271 272 273 274 275 276
##  [277] 277 278 279 280 281 282 283 284 285 286 287 288
##  [289] 289 290 291 292 293 294 295 296 297 298 299 300
##  [301] 301 302 303 304 305 306 307 308 309 310 311 312
##  [313] 313 314 315 316 317 318 319 320 321 322 323 324
##  [325] 325 326 327 328 329 330 331 332 333 334 335 336
##  [337] 337 338 339 340 341 342 343 344 345 346 347 348
##  [349] 349 350 351 352 353 354 355 356 357 358 359 360
##  [361] 361 362 363 364 365 366 367 368 369 370 371 372
##  [373] 373 374 375 376 377 378 379 380 381 382 383 384
##  [385] 385 386 387 388 389 390 391 392 393 394 395 396
##  [397] 397 398 399 400 401 402 403 404 405 406 407 408
##  [409] 409 410 411 412 413 414 415 416 417 418 419 420
##  [421] 421 422 423 424 425 426 427 428 429 430 431 432
##  [433] 433 434 435 436 437 438 439 440 441 442 443 444
##  [445] 445 446 447 448 449 450 451 452 453 454 455 456
##  [457] 457 458 459 460 461 462 463 464 465 466 467 468
##  [469] 469 470 471 472 473 474 475 476 477 478 479 480
##  [481] 481 482 483 484 485 486 487 488 489 490 491 492

```

##	[493]	493	494	495	496	497	498	499	500	501	502	503	504
##	[505]	505	506	507	508	509	510	511	512	513	514	515	516
##	[517]	517	518	519	520	521	522	523	524	525	526	527	528
##	[529]	529	530	531	532	533	534	535	536	537	538	539	540
##	[541]	541	542	543	544	545	546	547	548	549	550	551	552
##	[553]	553	554	555	556	557	558	559	560	561	562	563	564
##	[565]	565	566	567	568	569	570	571	572	573	574	575	576
##	[577]	577	578	579	580	581	582	583	584	585	586	587	588
##	[589]	589	590	591	592	593	594	595	596	597	598	599	600
##	[601]	601	602	603	604	605	606	607	608	609	610	611	612
##	[613]	613	614	615	616	617	618	619	620	621	622	623	624
##	[625]	625	626	627	628	629	630	631	632	633	634	635	636
##	[637]	637	638	639	640	641	642	643	644	645	646	647	648
##	[649]	649	650	651	652	653	654	655	656	657	658	659	660
##	[661]	661	662	663	664	665	666	667	668	669	670	671	672
##	[673]	673	674	675	676	677	678	679	680	681	682	683	684
##	[685]	685	686	687	688	689	690	691	692	693	694	695	696
##	[697]	697	698	699	700	701	702	703	704	705	706	707	708
##	[709]	709	710	711	712	713	714	715	716	717	718	719	720
##	[721]	721	722	723	724	725	726	727	728	729	730	731	732
##	[733]	733	734	735	736	737	738	739	740	741	742	743	744
##	[745]	745	746	747	748	749	750	751	752	753	754	755	756
##	[757]	757	758	759	760	761	762	763	764	765	766	767	768
##	[769]	769	770	771	772	773	774	775	776	777	778	779	780
##	[781]	781	782	783	784	785	786	787	788	789	790	791	792
##	[793]	793	794	795	796	797	798	799	800	801	802	803	804
##	[805]	805	806	807	808	809	810	811	812	813	814	815	816
##	[817]	817	818	819	820	821	822	823	824	825	826	827	828
##	[829]	829	830	831	832	833	834	835	836	837	838	839	840
##	[841]	841	842	843	844	845	846	847	848	849	850	851	852
##	[853]	853	854	855	856	857	858	859	860	861	862	863	864
##	[865]	865	866	867	868	869	870	871	872	873	874	875	876
##	[877]	877	878	879	880	881	882	883	884	885	886	887	888
##	[889]	889	890	891	892	893	894	895	896	897	898	899	900
##	[901]	901	902	903	904	905	906	907	908	909	910	911	912
##	[913]	913	914	915	916	917	918	919	920	921	922	923	924
##	[925]	925	926	927	928	929	930	931	932	933	934	935	936
##	[937]	937	938	939	940	941	942	943	944	945	946	947	948
##	[949]	949	950	951	952	953	954	955	956	957	958	959	960
##	[961]	961	962	963	964	965	966	967	968	969	970	971	972
##	[973]	973	974	975	976	977	978	979	980	981	982	983	984
##	[985]	985	986	987	988	989	990	991	992	993	994	995	996
##	[997]	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008
##	[1009]	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020
##	[1021]	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032
##	[1033]	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044
##	[1045]	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056
##	[1057]	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068
##	[1069]	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080
##	[1081]	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092
##	[1093]	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104
##	[1105]	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116
##	[1117]	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128
##	[1129]	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140

```

## [1141] 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152
## [1153] 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164
## [1165] 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176
## [1177] 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188
## [1189] 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200
## [1201] 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212
## [1213] 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224
## [1225] 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236
## [1237] 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248
## [1249] 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260
## [1261] 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272
## [1273] 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284
## [1285] 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296
## [1297] 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308
## [1309] 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320
## [1321] 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332
## [1333] 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344
## [1345] 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356
## [1357] 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368
## [1369] 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380
## [1381] 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392
## [1393] 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404
## [1405] 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416
## [1417] 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428
## [1429] 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440
## [1441] 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452
## [1453] 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464
## [1465] 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476
## [1477] 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488
## [1489] 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500
## [1501] 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512
## [1513] 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524
## [1525] 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536
## [1537] 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548
## [1549] 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560
## [1561] 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572
## [1573] 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584
## [1585] 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596
## [1597] 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608
## [1609] 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620
## [1621] 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632
## [1633] 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644
## [1645] 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656
## [1657] 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668
## [1669] 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680
## [1681] 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692
## [1693] 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704
## [1705] 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716
## [1717] 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728
## [1729] 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740
## [1741] 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752
## [1753] 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764
## [1765] 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776
## [1777] 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788

```

```

## [1789] 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800
## [1801] 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812
## [1813] 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824
## [1825] 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836
## [1837] 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848
## [1849] 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860
## [1861] 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872
## [1873] 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884
## [1885] 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896
## [1897] 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908
## [1909] 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920
## [1921] 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932
## [1933] 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944
## [1945] 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956
## [1957] 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968
## [1969] 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980
## [1981] 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992
## [1993] 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004
## [2005] 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
## [2017] 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028
## [2029] 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040
## [2041] 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052
## [2053] 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064
## [2065] 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076
## [2077] 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088
## [2089] 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100
## [2101] 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112
## [2113] 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124
## [2125] 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136
## [2137] 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148
## [2149] 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160
## [2161] 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172
## [2173] 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184
## [2185] 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196
## [2197] 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208
## [2209] 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220
## [2221] 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232
## [2233] 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244
## [2245] 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256
## [2257] 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268
## [2269] 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280
## [2281] 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292
## [2293] 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304
## [2305] 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316
## [2317] 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328
## [2329] 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340
## [2341] 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352
## [2353] 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364
## [2365] 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376
## [2377] 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388
## [2389] 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400
## [2401] 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412
## [2413] 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424
## [2425] 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436

```

```

## [2437] 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448
## [2449] 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460
## [2461] 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472
## [2473] 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484
## [2485] 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496
## [2497] 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508
## [2509] 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520
## [2521] 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532
## [2533] 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544
## [2545] 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556
## [2557] 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568
## [2569] 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580
## [2581] 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592
## [2593] 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604
## [2605] 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616
## [2617] 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628
## [2629] 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640
## [2641] 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652
## [2653] 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664
## [2665] 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676
## [2677] 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688
## [2689] 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700
## [2701] 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712
## [2713] 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724
## [2725] 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736
## [2737] 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748
## [2749] 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760
## [2761] 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772
## [2773] 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784
## [2785] 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796
## [2797] 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808
## [2809] 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820
## [2821] 2821 2822 2823 2824 2825 2826 2827 2828 2829 2830 2831 2832
## [2833] 2833 2834 2835 2836 2837 2838 2839 2840 2841 2842 2843 2844
## [2845] 2845 2846 2847 2848 2849 2850 2851 2852 2853 2854 2855 2856
## [2857] 2857 2858 2859 2860 2861 2862 2863 2864 2865 2866 2867 2868
## [2869] 2869 2870 2871 2872 2873 2874 2875 2876 2877 2878 2879 2880
## [2881] 2881 2882 2883 2884 2885 2886 2887 2888 2889 2890 2891 2892
## [2893] 2893 2894 2895 2896 2897 2898 2899 2900 2901 2902 2903 2904
## [2905] 2905 2906 2907 2908 2909 2910 2911 2912 2913 2914 2915 2916
## [2917] 2917 2918 2919 2920 2921 2922 2923 2924 2925 2926 2927 2928
## [2929] 2929 2930 2931 2932 2933 2934 2935 2936 2937 2938 2939 2940
## [2941] 2941 2942 2943 2944 2945 2946 2947 2948 2949 2950 2951 2952
## [2953] 2953 2954 2955 2956 2957 2958 2959 2960 2961 2962 2963 2964
## [2965] 2965 2966 2967 2968 2969 2970 2971 2972 2973 2974 2975 2976
## [2977] 2977 2978 2979 2980 2981 2982 2983 2984 2985 2986 2987 2988
## [2989] 2989 2990 2991 2992 2993 2994 2995 2996 2997 2998 2999 3000
## [3001] 3001 3002 3003 3004 3005 3006 3007 3008 3009 3010 3011 3012
## [3013] 3013 3014 3015 3016 3017 3018 3019 3020 3021 3022 3023 3024
## [3025] 3025 3026 3027 3028 3029 3030 3031 3032 3033 3034 3035 3036
## [3037] 3037 3038 3039 3040 3041 3042 3043 3044 3045 3046 3047 3048
## [3049] 3049 3050 3051 3052 3053 3054 3055 3056 3057 3058 3059 3060
## [3061] 3061 3062 3063 3064 3065 3066 3067 3068 3069 3070 3071 3072
## [3073] 3073 3074 3075 3076 3077 3078 3079 3080 3081 3082 3083 3084

```

```

## [3085] 3085 3086 3087 3088 3089 3090 3091 3092 3093 3094 3095 3096
## [3097] 3097 3098 3099 3100 3101 3102 3103 3104 3105 3106 3107 3108
## [3109] 3109 3110 3111 3112 3113 3114 3115 3116 3117 3118 3119 3120
## [3121] 3121 3122 3123 3124 3125 3126 3127 3128 3129 3130 3131 3132
## [3133] 3133 3134 3135 3136 3137 3138 3139 3140 3141 3142 3143 3144
## [3145] 3145 3146 3147 3148 3149 3150 3151 3152 3153 3154 3155 3156
## [3157] 3157 3158 3159 3160 3161 3162 3163 3164 3165 3166 3167 3168
## [3169] 3169 3170 3171 3172 3173 3174 3175 3176 3177 3178 3179 3180
## [3181] 3181 3182 3183 3184 3185 3186 3187 3188 3189 3190 3191 3192
## [3193] 3193 3194 3195 3196 3197 3198 3199 3200 3201 3202 3203 3204
## [3205] 3205 3206 3207 3208 3209 3210 3211 3212 3213 3214 3215 3216
## [3217] 3217 3218 3219 3220 3221 3222 3223 3224 3225 3226 3227 3228
## [3229] 3229 3230 3231 3232 3233 3234 3235 3236 3237 3238 3239 3240
## [3241] 3241 3242 3243 3244 3245 3246 3247 3248 3249 3250 3251 3252
## [3253] 3253 3254 3255 3256 3257 3258 3259 3260 3261 3262 3263 3264
## [3265] 3265 3266 3267 3268 3269 3270 3271 3272 3273 3274 3275 3276
## [3277] 3277 3278 3279 3280 3281 3282 3283 3284 3285 3286 3287 3288
## [3289] 3289 3290 3291 3292 3293 3294 3295 3296 3297 3298 3299 3300
## [3301] 3301 3302 3303 3304 3305 3306 3307 3308 3309 3310 3311 3312
## [3313] 3313 3314 3315 3316 3317 3318 3319 3320 3321 3322 3323 3324
## [3325] 3325 3326 3327 3328 3329 3330 3331 3332 3333 3334 3335 3336
## [3337] 3337 3338 3339 3340 3341 3342 3343 3344 3345 3346 3347 3348
## [3349] 3349 3350 3351 3352 3353 3354 3355 3356 3357 3358 3359 3360
## [3361] 3361 3362 3363 3364 3365 3366 3367 3368 3369 3370 3371 3372
## [3373] 3373 3374 3375 3376 3377 3378 3379 3380 3381 3382 3383 3384
## [3385] 3385 3386 3387 3388 3389 3390 3391 3392 3393 3394 3395 3396
## [3397] 3397 3398 3399 3400 3401 3402 3403 3404 3405 3406 3407 3408
## [3409] 3409 3410 3411 3412 3413 3414 3415 3416 3417 3418 3419 3420
## [3421] 3421 3422 3423 3424 3425 3426 3427 3428 3429 3430 3431 3432
## [3433] 3433 3434 3435 3436 3437 3438 3439 3440 3441 3442 3443 3444
## [3445] 3445 3446 3447 3448 3449 3450 3451 3452 3453 3454 3455 3456
## [3457] 3457 3458 3459 3460 3461 3462 3463 3464 3465 3466 3467 3468
## [3469] 3469 3470 3471 3472 3473 3474 3475 3476 3477 3478 3479 3480
## [3481] 3481 3482 3483 3484 3485 3486 3487 3488 3489 3490 3491 3492
## [3493] 3493 3494 3495 3496 3497 3498 3499 3500 3501 3502 3503 3504
## [3505] 3505 3506 3507 3508 3509 3510 3511 3512 3513 3514 3515 3516
## [3517] 3517 3518 3519 3520 3521 3522 3523 3524 3525 3526 3527 3528
## [3529] 3529 3530 3531 3532 3533 3534 3535 3536 3537 3538 3539 3540
## [3541] 3541 3542 3543 3544 3545 3546 3547 3548 3549 3550 3551 3552
## [3553] 3553 3554 3555 3556 3557 3558 3559 3560 3561 3562 3563 3564
## [3565] 3565 3566 3567 3568 3569 3570 3571 3572 3573 3574 3575 3576
## [3577] 3577 3578 3579 3580 3581 3582 3583 3584 3585 3586 3587 3588
## [3589] 3589 3590 3591 3592 3593 3594 3595 3596 3597 3598 3599 3600
## [3601] 3601 3602 3603 3604 3605 3606 3607 3608 3609 3610 3611 3612
## [3613] 3613 3614 3615 3616 3617 3618 3619 3620 3621 3622 3623 3624
## [3625] 3625 3626 3627 3628 3629 3630 3631 3632 3633 3634 3635 3636
## [3637] 3637 3638 3639 3640 3641 3642 3643 3644 3645 3646 3647 3648
## [3649] 3649 3650 3651 3652 3653 3654 3655 3656 3657 3658 3659 3660
## [3661] 3661 3662 3663 3664 3665 3666 3667 3668 3669 3670 3671 3672
## [3673] 3673 3674 3675 3676 3677 3678 3679 3680 3681 3682 3683 3684
## [3685] 3685 3686 3687 3688 3689 3690 3691 3692 3693 3694 3695 3696
## [3697] 3697 3698 3699 3700 3701 3702 3703 3704 3705 3706 3707 3708
## [3709] 3709 3710 3711 3712 3713 3714 3715 3716 3717 3718 3719 3720
## [3721] 3721 3722 3723 3724 3725 3726 3727 3728 3729 3730 3731 3732

```

```

## [3733] 3733 3734 3735 3736 3737 3738 3739 3740 3741 3742 3743 3744
## [3745] 3745 3746 3747 3748 3749 3750 3751 3752 3753 3754 3755 3756
## [3757] 3757 3758 3759 3760 3761 3762 3763 3764 3765 3766 3767 3768
## [3769] 3769 3770 3771 3772 3773 3774 3775 3776 3777 3778 3779 3780
## [3781] 3781 3782 3783 3784 3785 3786 3787 3788 3789 3790 3791 3792
## [3793] 3793 3794 3795 3796 3797 3798 3799 3800 3801 3802 3803 3804
## [3805] 3805 3806 3807 3808 3809 3810 3811 3812 3813 3814 3815 3816
## [3817] 3817 3818 3819 3820 3821 3822 3823 3824 3825 3826 3827 3828
## [3829] 3829 3830 3831 3832 3833 3834 3835 3836 3837 3838 3839 3840
## [3841] 3841 3842 3843 3844 3845 3846 3847 3848 3849 3850 3851 3852
## [3853] 3853 3854 3855 3856 3857 3858 3859 3860 3861 3862 3863 3864
## [3865] 3865 3866 3867 3868 3869 3870 3871 3872 3873 3874 3875 3876
## [3877] 3877 3878 3879 3880 3881 3882 3883 3884 3885 3886 3887 3888
## [3889] 3889 3890 3891 3892 3893 3894 3895 3896 3897 3898 3899 3900
## [3901] 3901 3902 3903 3904 3905 3906 3907 3908 3909 3910 3911 3912
## [3913] 3913 3914 3915 3916 3917 3918 3919 3920 3921 3922 3923 3924
## [3925] 3925 3926 3927 3928 3929 3930 3931 3932 3933 3934 3935 3936
## [3937] 3937 3938 3939 3940 3941 3942 3943 3944 3945 3946 3947 3948
## [3949] 3949 3950 3951 3952 3953 3954 3955 3956 3957 3958 3959 3960
## [3961] 3961 3962 3963 3964 3965 3966 3967 3968 3969 3970 3971 3972
## [3973] 3973 3974 3975 3976 3977 3978 3979 3980 3981 3982 3983 3984
## [3985] 3985 3986 3987 3988 3989 3990 3991 3992 3993 3994 3995 3996
## [3997] 3997 3998 3999 4000 4001 4002 4003 4004 4005 4006 4007 4008
## [4009] 4009 4010 4011 4012 4013 4014 4015 4016 4017 4018 4019 4020
## [4021] 4021 4022 4023 4024 4025 4026 4027 4028 4029 4030 4031 4032
## [4033] 4033 4034 4035 4036 4037 4038 4039 4040 4041 4042 4043 4044
## [4045] 4045 4046 4047 4048 4049 4050 4051 4052 4053 4054 4055 4056
## [4057] 4057 4058 4059 4060 4061 4062 4063 4064 4065 4066 4067 4068
## [4069] 4069 4070 4071 4072 4073 4074 4075 4076 4077 4078 4079 4080
## [4081] 4081 4082 4083 4084 4085 4086 4087 4088 4089 4090 4091 4092
## [4093] 4093 4094 4095 4096 4097 4098 4099 4100 4101 4102 4103 4104
## [4105] 4105 4106 4107 4108 4109 4110 4111 4112 4113 4114 4115 4116
## [4117] 4117 4118 4119 4120 4121 4122 4123 4124 4125 4126 4127 4128
## [4129] 4129 4130 4131 4132 4133 4134 4135 4136 4137 4138 4139 4140
## [4141] 4141 4142 4143 4144 4145 4146 4147 4148 4149 4150 4151 4152
## [4153] 4153 4154 4155 4156 4157 4158 4159 4160 4161 4162 4163 4164
## [4165] 4165 4166 4167 4168 4169 4170 4171 4172 4173 4174 4175 4176
## [4177] 4177 4178 4179 4180 4181 4182 4183 4184 4185 4186 4187 4188
## [4189] 4189 4190 4191 4192 4193 4194 4195 4196 4197 4198 4199 4200
## [4201] 4201 4202 4203 4204 4205 4206 4207 4208 4209 4210 4211 4212
## [4213] 4213 4214 4215 4216 4217 4218 4219 4220 4221 4222 4223 4224
## [4225] 4225 4226 4227 4228 4229 4230 4231 4232 4233 4234 4235 4236
## [4237] 4237 4238 4239 4240 4241 4242 4243 4244 4245 4246 4247 4248
## [4249] 4249 4250 4251 4252 4253 4254 4255 4256 4257 4258 4259 4260
## [4261] 4261 4262 4263 4264 4265 4266 4267 4268 4269 4270 4271 4272
## [4273] 4273 4274 4275 4276 4277 4278 4279 4280 4281 4282 4283 4284
## [4285] 4285 4286 4287 4288 4289 4290 4291 4292 4293 4294 4295 4296
## [4297] 4297 4298 4299 4300 4301 4302 4303 4304 4305 4306 4307 4308
## [4309] 4309 4310 4311 4312 4313 4314 4315 4316 4317 4318 4319 4320
## [4321] 4321 4322 4323 4324 4325 4326 4327 4328 4329 4330 4331 4332
## [4333] 4333 4334 4335 4336 4337 4338 4339 4340 4341 4342 4343 4344
## [4345] 4345 4346 4347 4348 4349 4350 4351 4352 4353 4354 4355 4356
## [4357] 4357 4358 4359 4360 4361 4362 4363 4364 4365 4366 4367 4368
## [4369] 4369 4370 4371 4372 4373 4374 4375 4376 4377 4378 4379 4380

```

```

## [4381] 4381 4382 4383 4384 4385 4386 4387 4388 4389 4390 4391 4392
## [4393] 4393 4394 4395 4396 4397 4398 4399 4400 4401 4402 4403 4404
## [4405] 4405 4406 4407 4408 4409 4410 4411 4412 4413 4414 4415 4416
## [4417] 4417 4418 4419 4420 4421 4422 4423 4424 4425 4426 4427 4428
## [4429] 4429 4430 4431 4432 4433 4434 4435 4436 4437 4438 4439 4440
## [4441] 4441 4442 4443 4444 4445 4446 4447 4448 4449 4450 4451 4452
## [4453] 4453 4454 4455 4456 4457 4458 4459 4460 4461 4462 4463 4464
## [4465] 4465 4466 4467 4468 4469 4470 4471 4472 4473 4474 4475 4476
## [4477] 4477 4478 4479 4480 4481 4482 4483 4484 4485 4486 4487 4488
## [4489] 4489 4490 4491 4492 4493 4494 4495 4496 4497 4498 4499 4500
## [4501] 4501 4502 4503 4504 4505 4506 4507 4508 4509 4510 4511 4512
## [4513] 4513 4514 4515 4516 4517 4518 4519 4520 4521 4522 4523 4524
## [4525] 4525 4526 4527 4528 4529 4530 4531 4532 4533 4534 4535 4536
## [4537] 4537 4538 4539 4540 4541 4542 4543 4544 4545 4546 4547 4548
## [4549] 4549 4550 4551 4552 4553 4554 4555 4556 4557 4558 4559 4560
## [4561] 4561 4562 4563 4564 4565 4566 4567 4568 4569 4570 4571 4572
## [4573] 4573 4574 4575 4576 4577 4578 4579 4580 4581 4582 4583 4584
## [4585] 4585 4586 4587 4588 4589 4590 4591 4592 4593 4594 4595 4596
## [4597] 4597 4598 4599 4600 4601 4602 4603 4604 4605 4606 4607 4608
## [4609] 4609 4610 4611 4612 4613 4614 4615 4616 4617 4618 4619 4620
## [4621] 4621 4622 4623 4624 4625 4626 4627 4628 4629 4630 4631 4632
## [4633] 4633 4634 4635 4636 4637 4638 4639 4640 4641 4642 4643 4644
## [4645] 4645 4646 4647 4648 4649 4650 4651 4652 4653 4654 4655 4656
## [4657] 4657 4658 4659 4660 4661 4662 4663 4664 4665 4666 4667 4668
## [4669] 4669 4670 4671 4672 4673 4674 4675 4676 4677 4678 4679 4680
## [4681] 4681 4682 4683 4684 4685 4686 4687 4688 4689 4690 4691 4692
## [4693] 4693 4694 4695 4696 4697 4698 4699 4700 4701 4702 4703 4704
## [4705] 4705 4706 4707 4708 4709 4710 4711 4712 4713 4714 4715 4716
## [4717] 4717 4718 4719 4720 4721 4722 4723 4724 4725 4726 4727 4728
## [4729] 4729 4730 4731 4732 4733 4734 4735 4736 4737 4738 4739 4740
## [4741] 4741 4742 4743 4744 4745 4746 4747 4748 4749 4750 4751 4752
## [4753] 4753 4754 4755 4756 4757 4758 4759 4760 4761 4762 4763 4764
## [4765] 4765 4766 4767 4768 4769 4770 4771 4772 4773 4774 4775 4776
## [4777] 4777 4778 4779 4780 4781 4782 4783 4784 4785 4786 4787 4788
## [4789] 4789 4790 4791 4792 4793 4794 4795 4796 4797 4798 4799 4800
## [4801] 4801 4802 4803 4804 4805 4806 4807 4808 4809 4810 4811 4812
## [4813] 4813 4814 4815 4816 4817 4818 4819 4820 4821 4822 4823 4824
## [4825] 4825 4826 4827 4828 4829 4830 4831 4832 4833 4834 4835 4836
## [4837] 4837 4838 4839 4840 4841 4842 4843 4844 4845 4846 4847 4848
## [4849] 4849 4850 4851 4852 4853 4854 4855 4856 4857 4858 4859 4860
## [4861] 4861 4862 4863 4864 4865 4866 4867 4868 4869 4870 4871 4872
## [4873] 4873 4874 4875 4876 4877 4878 4879 4880 4881 4882 4883 4884
## [4885] 4885 4886 4887 4888 4889 4890 4891 4892 4893 4894 4895 4896
## [4897] 4897 4898 4899 4900 4901 4902 4903 4904 4905 4906 4907 4908
## [4909] 4909 4910 4911 4912 4913 4914 4915 4916 4917 4918 4919 4920
## [4921] 4921 4922 4923 4924 4925 4926 4927 4928 4929 4930 4931 4932
## [4933] 4933 4934 4935 4936 4937 4938 4939 4940 4941 4942 4943 4944
## [4945] 4945 4946 4947 4948 4949 4950 4951 4952 4953 4954 4955 4956
## [4957] 4957 4958 4959 4960 4961 4962 4963 4964 4965 4966 4967 4968
## [4969] 4969 4970 4971 4972 4973 4974 4975 4976 4977 4978 4979 4980
## [4981] 4981 4982 4983 4984 4985 4986 4987 4988 4989 4990 4991 4992
## [4993] 4993 4994 4995 4996 4997 4998 4999 5000 5001 5002 5003 5004
## [5005] 5005 5006 5007 5008 5009 5010 5011 5012 5013 5014 5015 5016
## [5017] 5017 5018 5019 5020 5021 5022 5023 5024 5025 5026 5027 5028

```

```

## [5029] 5029 5030 5031 5032 5033 5034 5035 5036 5037 5038 5039 5040
## [5041] 5041 5042 5043 5044 5045 5046 5047 5048 5049 5050 5051 5052
## [5053] 5053 5054 5055 5056 5057 5058 5059 5060 5061 5062 5063 5064
## [5065] 5065 5066 5067 5068 5069 5070 5071 5072 5073 5074 5075 5076
## [5077] 5077 5078 5079 5080 5081 5082 5083 5084 5085 5086 5087 5088
## [5089] 5089 5090 5091 5092 5093 5094 5095 5096 5097 5098 5099 5100
## [5101] 5101 5102 5103 5104 5105 5106 5107 5108 5109 5110 5111 5112
## [5113] 5113 5114 5115 5116 5117 5118 5119 5120 5121 5122 5123 5124
## [5125] 5125 5126 5127 5128 5129 5130 5131 5132 5133 5134 5135 5136
## [5137] 5137 5138 5139 5140 5141 5142 5143 5144 5145 5146 5147 5148
## [5149] 5149 5150 5151 5152 5153 5154 5155 5156 5157 5158 5159 5160
## [5161] 5161 5162 5163 5164 5165 5166 5167 5168 5169 5170 5171 5172
## [5173] 5173 5174 5175 5176 5177 5178 5179 5180 5181 5182 5183 5184
## [5185] 5185 5186 5187 5188 5189 5190 5191 5192 5193 5194 5195 5196
## [5197] 5197 5198 5199 5200 5201 5202 5203 5204 5205 5206 5207 5208
## [5209] 5209 5210 5211 5212 5213 5214 5215 5216 5217 5218 5219 5220
## [5221] 5221 5222 5223 5224 5225 5226 5227 5228 5229 5230 5231 5232
## [5233] 5233 5234 5235 5236 5237 5238 5239 5240 5241 5242 5243 5244
## [5245] 5245 5246 5247 5248 5249 5250 5251 5252 5253 5254 5255 5256
## [5257] 5257 5258 5259 5260 5261 5262 5263 5264 5265 5266 5267 5268
## [5269] 5269 5270 5271 5272 5273 5274 5275 5276 5277 5278 5279 5280
## [5281] 5281 5282 5283 5284 5285 5286 5287 5288 5289 5290 5291 5292
## [5293] 5293 5294 5295 5296 5297 5298 5299 5300 5301 5302 5303 5304
## [5305] 5305 5306 5307 5308 5309 5310 5311 5312 5313 5314 5315 5316
## [5317] 5317 5318 5319 5320 5321 5322 5323 5324 5325 5326 5327 5328
## [5329] 5329 5330 5331 5332 5333 5334 5335 5336 5337 5338 5339 5340
## [5341] 5341 5342 5343 5344 5345 5346 5347 5348 5349 5350 5351 5352
## [5353] 5353 5354 5355 5356 5357 5358 5359 5360 5361 5362 5363 5364
## [5365] 5365 5366 5367 5368 5369 5370 5371 5372 5373 5374 5375 5376
## [5377] 5377 5378 5379 5380 5381 5382 5383 5384 5385 5386 5387 5388
## [5389] 5389 5390 5391 5392 5393 5394 5395 5396 5397 5398 5399 5400
## [5401] 5401 5402 5403 5404 5405 5406 5407 5408 5409 5410 5411 5412
## [5413] 5413 5414 5415 5416 5417 5418 5419 5420 5421 5422 5423 5424
## [5425] 5425 5426 5427 5428 5429 5430 5431 5432 5433 5434 5435 5436
## [5437] 5437 5438 5439 5440 5441 5442 5443 5444 5445 5446 5447 5448
## [5449] 5449 5450 5451 5452 5453 5454 5455 5456 5457 5458 5459 5460
## [5461] 5461 5462 5463 5464 5465 5466 5467 5468 5469 5470 5471 5472
## [5473] 5473 5474 5475 5476 5477 5478 5479 5480 5481 5482 5483 5484
## [5485] 5485 5486 5487 5488 5489 5490 5491 5492 5493 5494 5495 5496
## [5497] 5497 5498 5499 5500 5501 5502 5503 5504 5505 5506 5507 5508
## [5509] 5509 5510 5511 5512 5513 5514 5515 5516 5517 5518 5519 5520
## [5521] 5521 5522 5523 5524 5525 5526 5527 5528 5529 5530 5531 5532
## [5533] 5533 5534 5535 5536 5537 5538 5539 5540 5541 5542 5543 5544
## [5545] 5545 5546 5547 5548 5549 5550 5551 5552 5553 5554 5555 5556
## [5557] 5557 5558 5559 5560 5561 5562 5563 5564 5565 5566 5567 5568
## [5569] 5569 5570 5571 5572 5573 5574 5575 5576 5577 5578 5579 5580
## [5581] 5581 5582 5583 5584 5585 5586 5587 5588 5589 5590 5591 5592
## [5593] 5593 5594 5595 5596 5597 5598 5599 5600 5601 5602 5603 5604
## [5605] 5605 5606 5607 5608 5609 5610 5611 5612 5613 5614 5615 5616
## [5617] 5617 5618 5619 5620 5621 5622 5623 5624 5625 5626 5627 5628
## [5629] 5629 5630 5631 5632 5633 5634 5635 5636 5637 5638 5639 5640
## [5641] 5641 5642 5643 5644 5645 5646 5647 5648 5649 5650 5651 5652
## [5653] 5653 5654 5655 5656 5657 5658 5659 5660 5661 5662 5663 5664
## [5665] 5665 5666 5667 5668 5669 5670 5671 5672 5673 5674 5675 5676

```

##	[5677]	5677	5678	5679	5680	5681	5682	5683	5684	5685	5686	5687	5688
##	[5689]	5689	5690	5691	5692	5693	5694	5695	5696	5697	5698	5699	5700
##	[5701]	5701	5702	5703	5704	5705	5706	5707	5708	5709	5710	5711	5712
##	[5713]	5713	5714	5715	5716	5717	5718	5719	5720	5721	5722	5723	5724
##	[5725]	5725	5726	5727	5728	5729	5730	5731	5732	5733	5734	5735	5736
##	[5737]	5737	5738	5739	5740	5741	5742	5743	5744	5745	5746	5747	5748
##	[5749]	5749	5750	5751	5752	5753	5754	5755	5756	5757	5758	5759	5760
##	[5761]	5761	5762	5763	5764	5765	5766	5767	5768	5769	5770	5771	5772
##	[5773]	5773	5774	5775	5776	5777	5778	5779	5780	5781	5782	5783	5784
##	[5785]	5785	5786	5787	5788	5789	5790	5791	5792	5793	5794	5795	5796
##	[5797]	5797	5798	5799	5800	5801	5802	5803	5804	5805	5806	5807	5808
##	[5809]	5809	5810	5811	5812	5813	5814	5815	5816	5817	5818	5819	5820
##	[5821]	5821	5822	5823	5824	5825	5826	5827	5828	5829	5830	5831	5832
##	[5833]	5833	5834	5835	5836	5837	5838	5839	5840	5841	5842	5843	5844
##	[5845]	5845	5846	5847	5848	5849	5850	5851	5852	5853	5854	5855	5856
##	[5857]	5857	5858	5859	5860	5861	5862	5863	5864	5865	5866	5867	5868
##	[5869]	5869	5870	5871	5872	5873	5874	5875	5876	5877	5878	5879	5880
##	[5881]	5881	5882	5883	5884	5885	5886	5887	5888	5889	5890	5891	5892
##	[5893]	5893	5894	5895	5896	5897	5898	5899	5900	5901	5902	5903	5904
##	[5905]	5905	5906	5907	5908	5909	5910	5911	5912	5913	5914	5915	5916
##	[5917]	5917	5918	5919	5920	5921	5922	5923	5924	5925	5926	5927	5928
##	[5929]	5929	5930	5931	5932	5933	5934	5935	5936	5937	5938	5939	5940
##	[5941]	5941	5942	5943	5944	5945	5946	5947	5948	5949	5950	5951	5952
##	[5953]	5953	5954	5955	5956	5957	5958	5959	5960	5961	5962	5963	5964
##	[5965]	5965	5966	5967	5968	5969	5970	5971	5972	5973	5974	5975	5976
##	[5977]	5977	5978	5979	5980	5981	5982	5983	5984	5985	5986	5987	5988
##	[5989]	5989	5990	5991	5992	5993	5994	5995	5996	5997	5998	5999	6000
##	[6001]	6001	6002	6003	6004	6005	6006	6007	6008	6009	6010	6011	6012
##	[6013]	6013	6014	6015	6016	6017	6018	6019	6020	6021	6022	6023	6024
##	[6025]	6025	6026	6027	6028	6029	6030	6031	6032	6033	6034	6035	6036
##	[6037]	6037	6038	6039	6040	6041	6042	6043	6044	6045	6046	6047	6048
##	[6049]	6049	6050	6051	6052	6053	6054	6055	6056	6057	6058	6059	6060
##	[6061]	6061	6062	6063	6064	6065	6066	6067	6068	6069	6070	6071	6072
##	[6073]	6073	6074	6075	6076	6077	6078	6079	6080	6081	6082	6083	6084
##	[6085]	6085	6086	6087	6088	6089	6090	6091	6092	6093	6094	6095	6096
##	[6097]	6097	6098	6099	6100	6101	6102	6103	6104	6105	6106	6107	6108
##	[6109]	6109	6110	6111	6112	6113	6114	6115	6116	6117	6118	6119	6120
##	[6121]	6121	6122	6123	6124	6125	6126	6127	6128	6129	6130	6131	6132
##	[6133]	6133	6134	6135	6136	6137	6138	6139	6140	6141	6142	6143	6144
##	[6145]	6145	6146	6147	6148	6149	6150	6151	6152	6153	6154	6155	6156
##	[6157]	6157	6158	6159	6160	6161	6162	6163	6164	6165	6166	6167	6168
##	[6169]	6169	6170	6171	6172	6173	6174	6175	6176	6177	6178	6179	6180
##	[6181]	6181	6182	6183	6184	6185	6186	6187	6188	6189	6190	6191	6192
##	[6193]	6193	6194	6195	6196	6197	6198	6199	6200	6201	6202	6203	6204
##	[6205]	6205	6206	6207	6208	6209	6210	6211	6212	6213	6214	6215	6216
##	[6217]	6217	6218	6219	6220	6221	6222	6223	6224	6225	6226	6227	6228
##	[6229]	6229	6230	6231	6232	6233	6234	6235	6236	6237	6238	6239	6240
##	[6241]	6241	6242	6243	6244	6245	6246	6247	6248	6249	6250	6251	6252
##	[6253]	6253	6254	6255	6256	6257	6258	6259	6260	6261	6262	6263	6264
##	[6265]	6265	6266	6267	6268	6269	6270	6271	6272	6273	6274	6275	6276
##	[6277]	6277	6278	6279	6280	6281	6282	6283	6284	6285	6286	6287	6288
##	[6289]	6289	6290	6291	6292	6293	6294	6295	6296	6297	6298	6299	6300
##	[6301]	6301	6302	6303	6304	6305	6306	6307	6308	6309	6310	6311	6312
##	[6313]	6313	6314	6315	6316	6317	6318	6319	6320	6321	6322	6323	6324

##	[6325]	6325	6326	6327	6328	6329	6330	6331	6332	6333	6334	6335	6336
##	[6337]	6337	6338	6339	6340	6341	6342	6343	6344	6345	6346	6347	6348
##	[6349]	6349	6350	6351	6352	6353	6354	6355	6356	6357	6358	6359	6360
##	[6361]	6361	6362	6363	6364	6365	6366	6367	6368	6369	6370	6371	6372
##	[6373]	6373	6374	6375	6376	6377	6378	6379	6380	6381	6382	6383	6384
##	[6385]	6385	6386	6387	6388	6389	6390	6391	6392	6393	6394	6395	6396
##	[6397]	6397	6398	6399	6400	6401	6402	6403	6404	6405	6406	6407	6408
##	[6409]	6409	6410	6411	6412	6413	6414	6415	6416	6417	6418	6419	6420
##	[6421]	6421	6422	6423	6424	6425	6426	6427	6428	6429	6430	6431	6432
##	[6433]	6433	6434	6435	6436	6437	6438	6439	6440	6441	6442	6443	6444
##	[6445]	6445	6446	6447	6448	6449	6450	6451	6452	6453	6454	6455	6456
##	[6457]	6457	6458	6459	6460	6461	6462	6463	6464	6465	6466	6467	6468
##	[6469]	6469	6470	6471	6472	6473	6474	6475	6476	6477	6478	6479	6480
##	[6481]	6481	6482	6483	6484	6485	6486	6487	6488	6489	6490	6491	6492
##	[6493]	6493	6494	6495	6496	6497	6498	6499	6500	6501	6502	6503	6504
##	[6505]	6505	6506	6507	6508	6509	6510	6511	6512	6513	6514	6515	6516
##	[6517]	6517	6518	6519	6520	6521	6522	6523	6524	6525	6526	6527	6528
##	[6529]	6529	6530	6531	6532	6533	6534	6535	6536	6537	6538	6539	6540
##	[6541]	6541	6542	6543	6544	6545	6546	6547	6548	6549	6550	6551	6552
##	[6553]	6553	6554	6555	6556	6557	6558	6559	6560	6561	6562	6563	6564
##	[6565]	6565	6566	6567	6568	6569	6570	6571	6572	6573	6574	6575	6576
##	[6577]	6577	6578	6579	6580	6581	6582	6583	6584	6585	6586	6587	6588
##	[6589]	6589	6590	6591	6592	6593	6594	6595	6596	6597	6598	6599	6600
##	[6601]	6601	6602	6603	6604	6605	6606	6607	6608	6609	6610	6611	6612
##	[6613]	6613	6614	6615	6616	6617	6618	6619	6620	6621	6622	6623	6624
##	[6625]	6625	6626	6627	6628	6629	6630	6631	6632	6633	6634	6635	6636
##	[6637]	6637	6638	6639	6640	6641	6642	6643	6644	6645	6646	6647	6648
##	[6649]	6649	6650	6651	6652	6653	6654	6655	6656	6657	6658	6659	6660
##	[6661]	6661	6662	6663	6664	6665	6666	6667	6668	6669	6670	6671	6672
##	[6673]	6673	6674	6675	6676	6677	6678	6679	6680	6681	6682	6683	6684
##	[6685]	6685	6686	6687	6688	6689	6690	6691	6692	6693	6694	6695	6696
##	[6697]	6697	6698	6699	6700	6701	6702	6703	6704	6705	6706	6707	6708
##	[6709]	6709	6710	6711	6712	6713	6714	6715	6716	6717	6718	6719	6720
##	[6721]	6721	6722	6723	6724	6725	6726	6727	6728	6729	6730	6731	6732
##	[6733]	6733	6734	6735	6736	6737	6738	6739	6740	6741	6742	6743	6744
##	[6745]	6745	6746	6747	6748	6749	6750	6751	6752	6753	6754	6755	6756
##	[6757]	6757	6758	6759	6760	6761	6762	6763	6764	6765	6766	6767	6768
##	[6769]	6769	6770	6771	6772	6773	6774	6775	6776	6777	6778	6779	6780
##	[6781]	6781	6782	6783	6784	6785	6786	6787	6788	6789	6790	6791	6792
##	[6793]	6793	6794	6795	6796	6797	6798	6799	6800	6801	6802	6803	6804
##	[6805]	6805	6806	6807	6808	6809	6810	6811	6812	6813	6814	6815	6816
##	[6817]	6817	6818	6819	6820	6821	6822	6823	6824	6825	6826	6827	6828
##	[6829]	6829	6830	6831	6832	6833	6834	6835	6836	6837	6838	6839	6840
##	[6841]	6841	6842	6843	6844	6845	6846	6847	6848	6849	6850	6851	6852
##	[6853]	6853	6854	6855	6856	6857	6858	6859	6860	6861	6862	6863	6864
##	[6865]	6865	6866	6867	6868	6869	6870	6871	6872	6873	6874	6875	6876
##	[6877]	6877	6878	6879	6880	6881	6882	6883	6884	6885	6886	6887	6888
##	[6889]	6889	6890	6891	6892	6893	6894	6895	6896	6897	6898	6899	6900
##	[6901]	6901	6902	6903	6904	6905	6906	6907	6908	6909	6910	6911	6912
##	[6913]	6913	6914	6915	6916	6917	6918	6919	6920	6921	6922	6923	6924
##	[6925]	6925	6926	6927	6928	6929	6930	6931	6932	6933	6934	6935	6936
##	[6937]	6937	6938	6939	6940	6941	6942	6943	6944	6945	6946	6947	6948
##	[6949]	6949	6950	6951	6952	6953	6954	6955	6956	6957	6958	6959	6960
##	[6961]	6961	6962	6963	6964	6965	6966	6967	6968	6969	6970	6971	6972

```

## [6973] 6973 6974 6975 6976 6977 6978 6979 6980 6981 6982 6983 6984
## [6985] 6985 6986 6987 6988 6989 6990 6991 6992 6993 6994 6995 6996
## [6997] 6997 6998 6999 7000 7001 7002 7003 7004 7005 7006 7007 7008
## [7009] 7009 7010 7011 7012 7013 7014 7015 7016 7017 7018 7019 7020
## [7021] 7021 7022 7023 7024 7025 7026 7027 7028 7029 7030 7031 7032
## [7033] 7033 7034 7035 7036 7037 7038 7039 7040 7041 7042 7043 7044
## [7045] 7045 7046 7047 7048 7049 7050 7051 7052 7053 7054 7055 7056
## [7057] 7057 7058 7059 7060 7061 7062 7063 7064 7065 7066 7067 7068
## [7069] 7069 7070 7071 7072 7073 7074 7075 7076 7077 7078 7079 7080
## [7081] 7081 7082 7083 7084 7085 7086 7087 7088 7089 7090 7091 7092
## [7093] 7093 7094 7095 7096 7097 7098 7099 7100 7101 7102 7103 7104
## [7105] 7105 7106 7107 7108 7109 7110 7111 7112 7113 7114 7115 7116
## [7117] 7117 7118 7119 7120 7121 7122 7123 7124 7125 7126 7127 7128
## [7129] 7129 7130 7131 7132 7133 7134 7135 7136 7137 7138 7139 7140
## [7141] 7141 7142 7143 7144 7145 7146 7147 7148 7149 7150 7151 7152
## [7153] 7153 7154 7155 7156 7157 7158 7159 7160 7161 7162 7163 7164
## [7165] 7165 7166 7167 7168 7169 7170 7171 7172 7173 7174 7175 7176
## [7177] 7177 7178 7179 7180 7181 7182 7183 7184 7185 7186 7187 7188
## [7189] 7189 7190 7191 7192 7193 7194 7195 7196 7197 7198 7199 7200
## [7201] 7201 7202 7203 7204 7205 7206 7207 7208 7209 7210 7211 7212
## [7213] 7213 7214 7215 7216 7217 7218 7219 7220 7221 7222 7223 7224
## [7225] 7225 7226 7227 7228 7229 7230 7231 7232 7233 7234 7235 7236
## [7237] 7237 7238 7239 7240 7241 7242 7243 7244 7245 7246 7247 7248
## [7249] 7249 7250 7251 7252 7253 7254 7255 7256 7257 7258 7259 7260
## [7261] 7261 7262 7263 7264 7265 7266 7267 7268 7269 7270 7271 7272
## [7273] 7273 7274 7275 7276 7277 7278 7279 7280 7281 7282 7283 7284
## [7285] 7285 7286 7287 7288 7289 7290 7291 7292 7293 7294 7295 7296
## [7297] 7297 7298 7299 7300 7301 7302 7303 7304 7305 7306 7307 7308
## [7309] 7309 7310 7311 7312 7313 7314 7315 7316 7317 7318 7319 7320
## [7321] 7321 7322 7323 7324 7325 7326 7327 7328 7329 7330 7331 7332
## [7333] 7333 7334 7335 7336 7337 7338 7339 7340 7341 7342 7343 7344
## [7345] 7345 7346 7347 7348 7349 7350 7351 7352 7353 7354 7355 7356
## [7357] 7357 7358 7359 7360 7361 7362 7363 7364 7365 7366 7367 7368
## [7369] 7369 7370 7371 7372 7373 7374 7375 7376 7377 7378 7379 7380
## [7381] 7381 7382 7383 7384 7385 7386 7387 7388 7389 7390 7391 7392
## [7393] 7393 7394 7395 7396 7397 7398 7399 7400 7401 7402 7403 7404
## [7405] 7405 7406 7407 7408 7409 7410 7411 7412 7413 7414 7415 7416
## [7417] 7417 7418 7419 7420 7421 7422 7423 7424 7425 7426 7427 7428
## [7429] 7429 7430 7431 7432 7433 7434 7435 7436 7437 7438 7439 7440
## [7441] 7441 7442 7443 7444 7445 7446 7447 7448 7449 7450 7451 7452
## [7453] 7453 7454 7455 7456 7457 7458 7459 7460 7461 7462 7463 7464
## [7465] 7465 7466 7467 7468 7469 7470 7471 7472 7473 7474 7475 7476
## [7477] 7477 7478 7479 7480 7481 7482 7483 7484 7485 7486 7487 7488
## [7489] 7489 7490 7491 7492 7493 7494 7495 7496 7497 7498 7499 7500
## [7501] 7501 7502 7503 7504 7505 7506 7507 7508 7509 7510 7511 7512
## [7513] 7513 7514 7515 7516 7517 7518 7519 7520 7521 7522 7523 7524
## [7525] 7525 7526 7527 7528 7529 7530 7531 7532 7533 7534 7535 7536
## [7537] 7537 7538 7539 7540 7541 7542 7543 7544 7545 7546 7547 7548
## [7549] 7549 7550 7551 7552 7553 7554 7555 7556 7557 7558 7559 7560
## [7561] 7561 7562 7563 7564 7565 7566 7567 7568 7569 7570 7571 7572
## [7573] 7573 7574 7575 7576 7577 7578 7579 7580 7581 7582 7583 7584
## [7585] 7585 7586 7587 7588 7589 7590 7591 7592 7593 7594 7595 7596
## [7597] 7597 7598 7599 7600 7601 7602 7603 7604 7605 7606 7607 7608
## [7609] 7609 7610 7611 7612 7613 7614 7615 7616 7617 7618 7619 7620

```

##	[7621]	7621	7622	7623	7624	7625	7626	7627	7628	7629	7630	7631	7632
##	[7633]	7633	7634	7635	7636	7637	7638	7639	7640	7641	7642	7643	7644
##	[7645]	7645	7646	7647	7648	7649	7650	7651	7652	7653	7654	7655	7656
##	[7657]	7657	7658	7659	7660	7661	7662	7663	7664	7665	7666	7667	7668
##	[7669]	7669	7670	7671	7672	7673	7674	7675	7676	7677	7678	7679	7680
##	[7681]	7681	7682	7683	7684	7685	7686	7687	7688	7689	7690	7691	7692
##	[7693]	7693	7694	7695	7696	7697	7698	7699	7700	7701	7702	7703	7704
##	[7705]	7705	7706	7707	7708	7709	7710	7711	7712	7713	7714	7715	7716
##	[7717]	7717	7718	7719	7720	7721	7722	7723	7724	7725	7726	7727	7728
##	[7729]	7729	7730	7731	7732	7733	7734	7735	7736	7737	7738	7739	7740
##	[7741]	7741	7742	7743	7744	7745	7746	7747	7748	7749	7750	7751	7752
##	[7753]	7753	7754	7755	7756	7757	7758	7759	7760	7761	7762	7763	7764
##	[7765]	7765	7766	7767	7768	7769	7770	7771	7772	7773	7774	7775	7776
##	[7777]	7777	7778	7779	7780	7781	7782	7783	7784	7785	7786	7787	7788
##	[7789]	7789	7790	7791	7792	7793	7794	7795	7796	7797	7798	7799	7800
##	[7801]	7801	7802	7803	7804	7805	7806	7807	7808	7809	7810	7811	7812
##	[7813]	7813	7814	7815	7816	7817	7818	7819	7820	7821	7822	7823	7824
##	[7825]	7825	7826	7827	7828	7829	7830	7831	7832	7833	7834	7835	7836
##	[7837]	7837	7838	7839	7840	7841	7842	7843	7844	7845	7846	7847	7848
##	[7849]	7849	7850	7851	7852	7853	7854	7855	7856	7857	7858	7859	7860
##	[7861]	7861	7862	7863	7864	7865	7866	7867	7868	7869	7870	7871	7872
##	[7873]	7873	7874	7875	7876	7877	7878	7879	7880	7881	7882	7883	7884
##	[7885]	7885	7886	7887	7888	7889	7890	7891	7892	7893	7894	7895	7896
##	[7897]	7897	7898	7899	7900	7901	7902	7903	7904	7905	7906	7907	7908
##	[7909]	7909	7910	7911	7912	7913	7914	7915	7916	7917	7918	7919	7920
##	[7921]	7921	7922	7923	7924	7925	7926	7927	7928	7929	7930	7931	7932
##	[7933]	7933	7934	7935	7936	7937	7938	7939	7940	7941	7942	7943	7944
##	[7945]	7945	7946	7947	7948	7949	7950	7951	7952	7953	7954	7955	7956
##	[7957]	7957	7958	7959	7960	7961	7962	7963	7964	7965	7966	7967	7968
##	[7969]	7969	7970	7971	7972	7973	7974	7975	7976	7977	7978	7979	7980
##	[7981]	7981	7982	7983	7984	7985	7986	7987	7988	7989	7990	7991	7992
##	[7993]	7993	7994	7995	7996	7997	7998	7999	8000	8001	8002	8003	8004
##	[8005]	8005	8006	8007	8008	8009	8010	8011	8012	8013	8014	8015	8016
##	[8017]	8017	8018	8019	8020	8021	8022	8023	8024	8025	8026	8027	8028
##	[8029]	8029	8030	8031	8032	8033	8034	8035	8036	8037	8038	8039	8040
##	[8041]	8041	8042	8043	8044	8045	8046	8047	8048	8049	8050	8051	8052
##	[8053]	8053	8054	8055	8056	8057	8058	8059	8060	8061	8062	8063	8064
##	[8065]	8065	8066	8067	8068	8069	8070	8071	8072	8073	8074	8075	8076
##	[8077]	8077	8078	8079	8080	8081	8082	8083	8084	8085	8086	8087	8088
##	[8089]	8089	8090	8091	8092	8093	8094	8095	8096	8097	8098	8099	8100
##	[8101]	8101	8102	8103	8104	8105	8106	8107	8108	8109	8110	8111	8112
##	[8113]	8113	8114	8115	8116	8117	8118	8119	8120	8121	8122	8123	8124
##	[8125]	8125	8126	8127	8128	8129	8130	8131	8132	8133	8134	8135	8136
##	[8137]	8137	8138	8139	8140	8141	8142	8143	8144	8145	8146	8147	8148
##	[8149]	8149	8150	8151	8152	8153	8154	8155	8156	8157	8158	8159	8160
##	[8161]	8161	8162	8163	8164	8165	8166	8167	8168	8169	8170	8171	8172
##	[8173]	8173	8174	8175	8176	8177	8178	8179	8180	8181	8182	8183	8184
##	[8185]	8185	8186	8187	8188	8189	8190	8191	8192	8193	8194	8195	8196
##	[8197]	8197	8198	8199	8200	8201	8202	8203	8204	8205	8206	8207	8208
##	[8209]	8209	8210	8211	8212	8213	8214	8215	8216	8217	8218	8219	8220
##	[8221]	8221	8222	8223	8224	8225	8226	8227	8228	8229	8230	8231	8232
##	[8233]	8233	8234	8235	8236	8237	8238	8239	8240	8241	8242	8243	8244
##	[8245]	8245	8246	8247	8248	8249	8250	8251	8252	8253	8254	8255	8256
##	[8257]	8257	8258	8259	8260	8261	8262	8263	8264	8265	8266	8267	8268

```

## [8269] 8269 8270 8271 8272 8273 8274 8275 8276 8277 8278 8279 8280
## [8281] 8281 8282 8283 8284 8285 8286 8287 8288 8289 8290 8291 8292
## [8293] 8293 8294 8295 8296 8297 8298 8299 8300 8301 8302 8303 8304
## [8305] 8305 8306 8307 8308 8309 8310 8311 8312 8313 8314 8315 8316
## [8317] 8317 8318 8319 8320 8321 8322 8323 8324 8325 8326 8327 8328
## [8329] 8329 8330 8331 8332 8333 8334 8335 8336 8337 8338 8339 8340
## [8341] 8341 8342 8343 8344 8345 8346 8347 8348 8349 8350 8351 8352
## [8353] 8353 8354 8355 8356 8357 8358 8359 8360 8361 8362 8363 8364
## [8365] 8365 8366 8367 8368 8369 8370 8371 8372 8373 8374 8375 8376
## [8377] 8377 8378 8379 8380 8381 8382 8383 8384 8385 8386 8387 8388
## [8389] 8389 8390 8391 8392 8393 8394 8395 8396 8397 8398 8399 8400
## [8401] 8401 8402 8403 8404 8405 8406 8407 8408 8409 8410 8411 8412
## [8413] 8413 8414 8415 8416 8417 8418 8419 8420 8421 8422 8423 8424
## [8425] 8425 8426 8427 8428 8429 8430 8431 8432 8433 8434 8435 8436
## [8437] 8437 8438 8439 8440 8441 8442 8443 8444 8445 8446 8447 8448
## [8449] 8449 8450 8451 8452 8453 8454 8455 8456 8457 8458 8459 8460
## [8461] 8461 8462 8463 8464 8465 8466 8467 8468 8469 8470 8471 8472
## [8473] 8473 8474 8475 8476 8477 8478 8479 8480 8481 8482 8483 8484
## [8485] 8485 8486 8487 8488 8489 8490 8491 8492 8493 8494 8495 8496
## [8497] 8497 8498 8499 8500 8501 8502 8503 8504 8505 8506 8507 8508
## [8509] 8509 8510 8511 8512 8513 8514 8515 8516 8517 8518 8519 8520
## [8521] 8521 8522 8523 8524 8525 8526 8527 8528 8529 8530 8531 8532
## [8533] 8533 8534 8535 8536 8537 8538 8539 8540 8541 8542 8543 8544
## [8545] 8545 8546 8547 8548 8549 8550 8551 8552 8553 8554 8555 8556
## [8557] 8557 8558 8559 8560 8561 8562 8563 8564 8565 8566 8567 8568
## [8569] 8569 8570 8571 8572 8573 8574 8575 8576 8577 8578 8579 8580
## [8581] 8581 8582 8583 8584 8585 8586 8587 8588 8589 8590 8591 8592
## [8593] 8593 8594 8595 8596 8597 8598 8599 8600 8601 8602 8603 8604
## [8605] 8605 8606 8607 8608 8609 8610 8611 8612 8613 8614 8615 8616
## [8617] 8617 8618 8619 8620 8621 8622 8623 8624 8625 8626 8627 8628
## [8629] 8629 8630 8631 8632 8633 8634 8635 8636 8637 8638 8639 8640
## [8641] 8641 8642 8643 8644 8645 8646 8647 8648 8649 8650 8651 8652
## [8653] 8653 8654 8655 8656 8657 8658 8659 8660 8661 8662 8663 8664
## [8665] 8665 8666 8667 8668 8669 8670 8671 8672 8673 8674 8675 8676
## [8677] 8677 8678 8679 8680 8681 8682 8683 8684 8685 8686 8687 8688
## [8689] 8689 8690 8691 8692 8693 8694 8695 8696 8697 8698 8699 8700
## [8701] 8701 8702 8703 8704 8705 8706 8707 8708 8709 8710 8711 8712
## [8713] 8713 8714 8715 8716 8717 8718 8719 8720 8721 8722 8723 8724
## [8725] 8725 8726 8727 8728 8729 8730 8731 8732 8733 8734 8735 8736
## [8737] 8737 8738 8739 8740 8741 8742 8743 8744 8745 8746 8747 8748
## [8749] 8749 8750 8751 8752 8753 8754 8755 8756 8757 8758 8759 8760
## [8761] 8761 8762 8763 8764 8765 8766 8767 8768 8769 8770 8771 8772
## [8773] 8773 8774 8775 8776 8777 8778 8779 8780 8781 8782 8783 8784
## [8785] 8785 8786 8787 8788 8789 8790 8791 8792 8793 8794 8795 8796
## [8797] 8797 8798 8799 8800 8801 8802 8803 8804 8805 8806 8807 8808
## [8809] 8809 8810 8811 8812 8813 8814 8815 8816 8817 8818 8819 8820
## [8821] 8821 8822 8823 8824 8825 8826 8827 8828 8829 8830 8831 8832
## [8833] 8833 8834 8835 8836 8837 8838 8839 8840 8841 8842 8843 8844
## [8845] 8845 8846 8847 8848 8849 8850 8851 8852 8853 8854 8855 8856
## [8857] 8857 8858 8859 8860 8861 8862 8863 8864 8865 8866 8867 8868
## [8869] 8869 8870 8871 8872 8873 8874 8875 8876 8877 8878 8879 8880
## [8881] 8881 8882 8883 8884 8885 8886 8887 8888 8889 8890 8891 8892
## [8893] 8893 8894 8895 8896 8897 8898 8899 8900 8901 8902 8903 8904
## [8905] 8905 8906 8907 8908 8909 8910 8911 8912 8913 8914 8915 8916

```

##	[8917]	8917	8918	8919	8920	8921	8922	8923	8924	8925	8926	8927	8928
##	[8929]	8929	8930	8931	8932	8933	8934	8935	8936	8937	8938	8939	8940
##	[8941]	8941	8942	8943	8944	8945	8946	8947	8948	8949	8950	8951	8952
##	[8953]	8953	8954	8955	8956	8957	8958	8959	8960	8961	8962	8963	8964
##	[8965]	8965	8966	8967	8968	8969	8970	8971	8972	8973	8974	8975	8976
##	[8977]	8977	8978	8979	8980	8981	8982	8983	8984	8985	8986	8987	8988
##	[8989]	8989	8990	8991	8992	8993	8994	8995	8996	8997	8998	8999	9000
##	[9001]	9001	9002	9003	9004	9005	9006	9007	9008	9009	9010	9011	9012
##	[9013]	9013	9014	9015	9016	9017	9018	9019	9020	9021	9022	9023	9024
##	[9025]	9025	9026	9027	9028	9029	9030	9031	9032	9033	9034	9035	9036
##	[9037]	9037	9038	9039	9040	9041	9042	9043	9044	9045	9046	9047	9048
##	[9049]	9049	9050	9051	9052	9053	9054	9055	9056	9057	9058	9059	9060
##	[9061]	9061	9062	9063	9064	9065	9066	9067	9068	9069	9070	9071	9072
##	[9073]	9073	9074	9075	9076	9077	9078	9079	9080	9081	9082	9083	9084
##	[9085]	9085	9086	9087	9088	9089	9090	9091	9092	9093	9094	9095	9096
##	[9097]	9097	9098	9099	9100	9101	9102	9103	9104	9105	9106	9107	9108
##	[9109]	9109	9110	9111	9112	9113	9114	9115	9116	9117	9118	9119	9120
##	[9121]	9121	9122	9123	9124	9125	9126	9127	9128	9129	9130	9131	9132
##	[9133]	9133	9134	9135	9136	9137	9138	9139	9140	9141	9142	9143	9144
##	[9145]	9145	9146	9147	9148	9149	9150	9151	9152	9153	9154	9155	9156
##	[9157]	9157	9158	9159	9160	9161	9162	9163	9164	9165	9166	9167	9168
##	[9169]	9169	9170	9171	9172	9173	9174	9175	9176	9177	9178	9179	9180
##	[9181]	9181	9182	9183	9184	9185	9186	9187	9188	9189	9190	9191	9192
##	[9193]	9193	9194	9195	9196	9197	9198	9199	9200	9201	9202	9203	9204
##	[9205]	9205	9206	9207	9208	9209	9210	9211	9212	9213	9214	9215	9216
##	[9217]	9217	9218	9219	9220	9221	9222	9223	9224	9225	9226	9227	9228
##	[9229]	9229	9230	9231	9232	9233	9234	9235	9236	9237	9238	9239	9240
##	[9241]	9241	9242	9243	9244	9245	9246	9247	9248	9249	9250	9251	9252
##	[9253]	9253	9254	9255	9256	9257	9258	9259	9260	9261	9262	9263	9264
##	[9265]	9265	9266	9267	9268	9269	9270	9271	9272	9273	9274	9275	9276
##	[9277]	9277	9278	9279	9280	9281	9282	9283	9284	9285	9286	9287	9288
##	[9289]	9289	9290	9291	9292	9293	9294	9295	9296	9297	9298	9299	9300
##	[9301]	9301	9302	9303	9304	9305	9306	9307	9308	9309	9310	9311	9312
##	[9313]	9313	9314	9315	9316	9317	9318	9319	9320	9321	9322	9323	9324
##	[9325]	9325	9326	9327	9328	9329	9330	9331	9332	9333	9334	9335	9336
##	[9337]	9337	9338	9339	9340	9341	9342	9343	9344	9345	9346	9347	9348
##	[9349]	9349	9350	9351	9352	9353	9354	9355	9356	9357	9358	9359	9360
##	[9361]	9361	9362	9363	9364	9365	9366	9367	9368	9369	9370	9371	9372
##	[9373]	9373	9374	9375	9376	9377	9378	9379	9380	9381	9382	9383	9384
##	[9385]	9385	9386	9387	9388	9389	9390	9391	9392	9393	9394	9395	9396
##	[9397]	9397	9398	9399	9400	9401	9402	9403	9404	9405	9406	9407	9408
##	[9409]	9409	9410	9411	9412	9413	9414	9415	9416	9417	9418	9419	9420
##	[9421]	9421	9422	9423	9424	9425	9426	9427	9428	9429	9430	9431	9432
##	[9433]	9433	9434	9435	9436	9437	9438	9439	9440	9441	9442	9443	9444
##	[9445]	9445	9446	9447	9448	9449	9450	9451	9452	9453	9454	9455	9456
##	[9457]	9457	9458	9459	9460	9461	9462	9463	9464	9465	9466	9467	9468
##	[9469]	9469	9470	9471	9472	9473	9474	9475	9476	9477	9478	9479	9480
##	[9481]	9481	9482	9483	9484	9485	9486	9487	9488	9489	9490	9491	9492
##	[9493]	9493	9494	9495	9496	9497	9498	9499	9500	9501	9502	9503	9504
##	[9505]	9505	9506	9507	9508	9509	9510	9511	9512	9513	9514	9515	9516
##	[9517]	9517	9518	9519	9520	9521	9522	9523	9524	9525	9526	9527	9528
##	[9529]	9529	9530	9531	9532	9533	9534	9535	9536	9537	9538	9539	9540
##	[9541]	9541	9542	9543	9544	9545	9546	9547	9548	9549	9550	9551	9552
##	[9553]	9553	9554	9555	9556	9557	9558	9559	9560	9561	9562	9563	9564

##	[9565]	9565	9566	9567	9568	9569	9570	9571	9572	9573	9574	9575	9576
##	[9577]	9577	9578	9579	9580	9581	9582	9583	9584	9585	9586	9587	9588
##	[9589]	9589	9590	9591	9592	9593	9594	9595	9596	9597	9598	9599	9600
##	[9601]	9601	9602	9603	9604	9605	9606	9607	9608	9609	9610	9611	9612
##	[9613]	9613	9614	9615	9616	9617	9618	9619	9620	9621	9622	9623	9624
##	[9625]	9625	9626	9627	9628	9629	9630	9631	9632	9633	9634	9635	9636
##	[9637]	9637	9638	9639	9640	9641	9642	9643	9644	9645	9646	9647	9648
##	[9649]	9649	9650	9651	9652	9653	9654	9655	9656	9657	9658	9659	9660
##	[9661]	9661	9662	9663	9664	9665	9666	9667	9668	9669	9670	9671	9672
##	[9673]	9673	9674	9675	9676	9677	9678	9679	9680	9681	9682	9683	9684
##	[9685]	9685	9686	9687	9688	9689	9690	9691	9692	9693	9694	9695	9696
##	[9697]	9697	9698	9699	9700	9701	9702	9703	9704	9705	9706	9707	9708
##	[9709]	9709	9710	9711	9712	9713	9714	9715	9716	9717	9718	9719	9720
##	[9721]	9721	9722	9723	9724	9725	9726	9727	9728	9729	9730	9731	9732
##	[9733]	9733	9734	9735	9736	9737	9738	9739	9740	9741	9742	9743	9744
##	[9745]	9745	9746	9747	9748	9749	9750	9751	9752	9753	9754	9755	9756
##	[9757]	9757	9758	9759	9760	9761	9762	9763	9764	9765	9766	9767	9768
##	[9769]	9769	9770	9771	9772	9773	9774	9775	9776	9777	9778	9779	9780
##	[9781]	9781	9782	9783	9784	9785	9786	9787	9788	9789	9790	9791	9792
##	[9793]	9793	9794	9795	9796	9797	9798	9799	9800	9801	9802	9803	9804
##	[9805]	9805	9806	9807	9808	9809	9810	9811	9812	9813	9814	9815	9816
##	[9817]	9817	9818	9819	9820	9821	9822	9823	9824	9825	9826	9827	9828
##	[9829]	9829	9830	9831	9832	9833	9834	9835	9836	9837	9838	9839	9840
##	[9841]	9841	9842	9843	9844	9845	9846	9847	9848	9849	9850	9851	9852
##	[9853]	9853	9854	9855	9856	9857	9858	9859	9860	9861	9862	9863	9864
##	[9865]	9865	9866	9867	9868	9869	9870	9871	9872	9873	9874	9875	9876
##	[9877]	9877	9878	9879	9880	9881	9882	9883	9884	9885	9886	9887	9888
##	[9889]	9889	9890	9891	9892	9893	9894	9895	9896	9897	9898	9899	9900
##	[9901]	9901	9902	9903	9904	9905	9906	9907	9908	9909	9910	9911	9912
##	[9913]	9913	9914	9915	9916	9917	9918	9919	9920	9921	9922	9923	9924
##	[9925]	9925	9926	9927	9928	9929	9930	9931	9932	9933	9934	9935	9936
##	[9937]	9937	9938	9939	9940	9941	9942	9943	9944	9945	9946	9947	9948
##	[9949]	9949	9950	9951	9952	9953	9954	9955	9956	9957	9958	9959	9960
##	[9961]	9961	9962	9963	9964	9965	9966	9967	9968	9969	9970	9971	9972
##	[9973]	9973	9974	9975	9976	9977	9978	9979	9980	9981	9982	9983	9984
##	[9985]	9985	9986	9987	9988	9989	9990	9991	9992	9993	9994	9995	9996
##	[9997]	9997	9998	9999	10000	10001	10002	10003	10004	10005	10006	10007	10008
##	[10009]	10009	10010	10011	10012	10013	10014	10015	10016	10017	10018	10019	10020
##	[10021]	10021	10022	10023	10024	10025	10026	10027	10028	10029	10030	10031	10032
##	[10033]	10033	10034	10035	10036	10037	10038	10039	10040	10041	10042	10043	10044
##	[10045]	10045	10046	10047	10048	10049	10050	10051	10052	10053	10054	10055	10056
##	[10057]	10057	10058	10059	10060	10061	10062	10063	10064	10065	10066	10067	10068
##	[10069]	10069	10070	10071	10072	10073	10074	10075	10076	10077	10078	10079	10080
##	[10081]	10081	10082	10083	10084	10085	10086	10087	10088	10089	10090	10091	10092
##	[10093]	10093	10094	10095	10096	10097	10098	10099	10100	10101	10102	10103	10104
##	[10105]	10105	10106	10107	10108	10109	10110	10111	10112	10113	10114	10115	10116
##	[10117]	10117	10118	10119	10120	10121	10122	10123	10124	10125	10126	10127	10128
##	[10129]	10129	10130	10131	10132	10133	10134	10135	10136	10137	10138	10139	10140
##	[10141]	10141	10142	10143	10144	10145	10146	10147	10148	10149	10150	10151	10152
##	[10153]	10153	10154	10155	10156	10157	10158	10159	10160	10161	10162	10163	10164
##	[10165]	10165	10166	10167	10168	10169	10170	10171	10172	10173	10174	10175	10176
##	[10177]	10177	10178	10179	10180	10181	10182	10183	10184	10185	10186	10187	10188
##	[10189]	10189	10190	10191	10192	10193	10194	10195	10196	10197	10198	10199	10200
##	[10201]	10201	10202	10203	10204	10205	10206	10207	10208	10209	10210	10211	10212

```

## [10213] 10213 10214 10215 10216 10217 10218 10219 10220 10221 10222 10223 10224
## [10225] 10225 10226 10227 10228 10229 10230 10231 10232 10233 10234 10235 10236
## [10237] 10237 10238 10239 10240 10241 10242 10243 10244 10245 10246 10247 10248
## [10249] 10249 10250 10251 10252 10253 10254 10255 10256 10257 10258 10259 10260
## [10261] 10261 10262 10263 10264 10265 10266 10267 10268 10269 10270 10271 10272
## [10273] 10273 10274 10275 10276 10277 10278 10279 10280 10281 10282 10283 10284
## [10285] 10285 10286 10287 10288 10289 10290 10291 10292 10293 10294 10295 10296
## [10297] 10297 10298 10299 10300 10301 10302 10303 10304 10305 10306 10307 10308
## [10309] 10309 10310 10311 10312 10313 10314 10315 10316 10317 10318 10319 10320
## [10321] 10321 10322 10323 10324 10325 10326 10327 10328 10329 10330 10331 10332
## [10333] 10333 10334 10335 10336 10337 10338 10339 10340 10341 10342 10343 10344
## [10345] 10345 10346 10347 10348 10349 10350 10351 10352 10353 10354 10355 10356
## [10357] 10357 10358 10359 10360 10361 10362 10363 10364 10365 10366 10367 10368
## [10369] 10369 10370 10371 10372 10373 10374 10375 10376 10377 10378 10379 10380
## [10381] 10381 10382 10383 10384 10385 10386 10387 10388 10389 10390 10391 10392
## [10393] 10393 10394 10395 10396 10397 10398 10399 10400 10401 10402 10403 10404
## [10405] 10405 10406 10407 10408 10409 10410 10411 10412 10413 10414 10415 10416
## [10417] 10417 10418 10419 10420 10421 10422 10423 10424 10425 10426 10427 10428
## [10429] 10429 10430 10431 10432 10433 10434 10435 10436 10437 10438 10439 10440
## [10441] 10441 10442 10443 10444 10445 10446 10447 10448 10449 10450 10451 10452
## [10453] 10453 10454 10455 10456 10457 10458 10459 10460 10461 10462 10463 10464
## [10465] 10465 10466 10467 10468 10469 10470 10471 10472 10473 10474 10475 10476
## [10477] 10477 10478 10479 10480 10481 10482 10483 10484 10485 10486 10487 10488
## [10489] 10489 10490 10491 10492 10493 10494 10495 10496 10497 10498 10499 10500
## [10501] 10501 10502 10503 10504 10505 10506 10507 10508 10509 10510 10511 10512
## [10513] 10513 10514 10515 10516 10517 10518 10519 10520 10521 10522 10523 10524
## [10525] 10525 10526 10527 10528 10529 10530 10531 10532 10533 10534 10535 10536
## [10537] 10537 10538 10539 10540 10541 10542 10543 10544 10545 10546 10547 10548
## [10549] 10549 10550 10551 10552 10553 10554 10555 10556 10557 10558 10559 10560
## [10561] 10561 10562 10563 10564 10565 10566 10567 10568 10569 10570 10571 10572
## [10573] 10573 10574 10575 10576 10577 10578 10579 10580 10581 10582 10583 10584
## [10585] 10585 10586 10587 10588 10589 10590 10591 10592 10593 10594 10595 10596
## [10597] 10597 10598 10599 10600 10601 10602 10603 10604 10605 10606 10607 10608
## [10609] 10609 10610 10611 10612 10613 10614 10615 10616 10617 10618 10619 10620
## [10621] 10621 10622 10623 10624 10625 10626 10627 10628 10629 10630 10631 10632
## [10633] 10633 10634 10635 10636 10637 10638 10639 10640 10641 10642 10643 10644
## [10645] 10645 10646 10647 10648 10649 10650 10651 10652 10653 10654 10655 10656
## [10657] 10657 10658 10659 10660 10661 10662 10663 10664 10665 10666 10667 10668
## [10669] 10669 10670 10671 10672 10673 10674 10675 10676 10677 10678 10679 10680
## [10681] 10681 10682 10683 10684 10685 10686 10687 10688 10689 10690 10691 10692
## [10693] 10693 10694 10695 10696 10697 10698 10699 10700 10701 10702 10703 10704
## [10705] 10705 10706 10707 10708 10709 10710 10711 10712 10713 10714 10715 10716
## [10717] 10717 10718 10719 10720 10721 10722 10723 10724 10725 10726 10727 10728
## [10729] 10729 10730 10731 10732 10733 10734 10735 10736 10737 10738 10739 10740
## [10741] 10741 10742 10743 10744 10745 10746 10747 10748 10749 10750 10751 10752
## [10753] 10753 10754 10755 10756 10757 10758 10759 10760 10761 10762 10763 10764
## [10765] 10765 10766 10767 10768 10769 10770 10771 10772 10773 10774 10775 10776
## [10777] 10777 10778 10779 10780 10781 10782 10783 10784 10785 10786 10787 10788
## [10789] 10789 10790 10791 10792 10793 10794 10795 10796 10797 10798 10799 10800
## [10801] 10801 10802 10803 10804 10805 10806 10807 10808 10809 10810 10811 10812
## [10813] 10813 10814 10815 10816 10817 10818 10819 10820 10821 10822 10823 10824
## [10825] 10825 10826 10827 10828 10829 10830 10831 10832 10833 10834 10835 10836
## [10837] 10837 10838 10839 10840 10841 10842 10843 10844 10845 10846 10847 10848
## [10849] 10849 10850 10851 10852 10853 10854 10855 10856 10857 10858 10859 10860

```

```

## [10861] 10861 10862 10863 10864 10865 10866 10867 10868 10869 10870 10871 10872
## [10873] 10873 10874 10875 10876 10877 10878 10879 10880 10881 10882 10883 10884
## [10885] 10885 10886 10887 10888 10889 10890 10891 10892 10893 10894 10895 10896
## [10897] 10897 10898 10899 10900 10901 10902 10903 10904 10905 10906 10907 10908
## [10909] 10909 10910 10911 10912 10913 10914 10915 10916 10917 10918 10919 10920
## [10921] 10921 10922 10923 10924 10925 10926 10927 10928 10929 10930 10931 10932
## [10933] 10933 10934 10935 10936 10937 10938 10939 10940 10941 10942 10943 10944
## [10945] 10945 10946 10947 10948 10949 10950 10951 10952 10953 10954 10955 10956
## [10957] 10957 10958 10959 10960 10961 10962 10963 10964 10965 10966 10967 10968
## [10969] 10969 10970 10971 10972 10973 10974 10975 10976 10977 10978 10979 10980
## [10981] 10981 10982 10983 10984 10985 10986 10987 10988 10989 10990 10991 10992
## [10993] 10993 10994 10995 10996 10997 10998 10999 11000 11001 11002 11003 11004
## [11005] 11005 11006 11007 11008 11009 11010 11011 11012 11013 11014 11015 11016
## [11017] 11017 11018 11019 11020 11021 11022 11023 11024 11025 11026 11027 11028
## [11029] 11029 11030 11031 11032 11033 11034 11035 11036 11037 11038 11039 11040
## [11041] 11041 11042 11043 11044 11045 11046 11047 11048 11049 11050 11051 11052
## [11053] 11053 11054 11055 11056 11057 11058 11059 11060 11061 11062 11063 11064
## [11065] 11065 11066 11067 11068 11069 11070 11071 11072 11073 11074 11075 11076
## [11077] 11077 11078 11079 11080 11081 11082 11083 11084 11085 11086 11087 11088
## [11089] 11089 11090 11091 11092 11093 11094 11095 11096 11097 11098 11099 11100
## [11101] 11101 11102 11103 11104 11105 11106 11107 11108 11109 11110 11111 11112
## [11113] 11113 11114 11115 11116 11117 11118 11119 11120 11121 11122 11123 11124
## [11125] 11125 11126 11127 11128 11129 11130 11131 11132 11133 11134 11135 11136
## [11137] 11137 11138 11139 11140 11141 11142 11143 11144 11145 11146 11147 11148
## [11149] 11149 11150 11151 11152 11153 11154 11155 11156 11157 11158 11159 11160
## [11161] 11161 11162 11163 11164 11165 11166 11167 11168 11169 11170 11171 11172
## [11173] 11173 11174 11175 11176 11177 11178 11179 11180 11181 11182 11183 11184
## [11185] 11185 11186 11187 11188 11189 11190 11191 11192 11193 11194 11195 11196
## [11197] 11197 11198 11199 11200 11201 11202 11203 11204 11205 11206 11207 11208
## [11209] 11209 11210 11211 11212 11213 11214 11215 11216 11217 11218 11219 11220
## [11221] 11221 11222 11223 11224 11225 11226 11227 11228 11229 11230 11231 11232
## [11233] 11233 11234 11235 11236 11237 11238 11239 11240 11241 11242 11243 11244
## [11245] 11245 11246 11247 11248 11249 11250 11251 11252 11253 11254 11255 11256
## [11257] 11257 11258 11259 11260 11261 11262 11263 11264 11265 11266 11267 11268
## [11269] 11269 11270 11271 11272 11273 11274 11275 11276 11277 11278 11279 11280
## [11281] 11281 11282 11283 11284 11285 11286 11287 11288 11289 11290 11291 11292
## [11293] 11293 11294 11295 11296 11297 11298 11299 11300 11301 11302 11303 11304
## [11305] 11305 11306 11307 11308 11309 11310 11311 11312 11313 11314 11315 11316
## [11317] 11317 11318 11319 11320 11321 11322 11323 11324 11325 11326 11327 11328
## [11329] 11329 11330 11331 11332 11333 11334 11335 11336 11337 11338 11339 11340
## [11341] 11341 11342 11343 11344 11345 11346 11347 11348 11349 11350 11351 11352
## [11353] 11353 11354 11355 11356 11357 11358 11359 11360 11361 11362 11363 11364
## [11365] 11365 11366 11367 11368 11369 11370 11371 11372 11373 11374 11375 11376
## [11377] 11377 11378 11379 11380 11381 11382 11383 11384 11385 11386 11387 11388
## [11389] 11389 11390 11391 11392 11393 11394 11395 11396 11397 11398 11399 11400
## [11401] 11401 11402 11403 11404 11405 11406 11407 11408 11409 11410 11411 11412
## [11413] 11413 11414 11415 11416 11417 11418 11419 11420 11421 11422 11423 11424
## [11425] 11425 11426 11427 11428 11429 11430 11431 11432 11433 11434 11435 11436
## [11437] 11437 11438 11439 11440 11441 11442 11443 11444 11445 11446 11447 11448
## [11449] 11449 11450 11451 11452 11453 11454 11455 11456 11457 11458 11459 11460
## [11461] 11461 11462 11463 11464 11465 11466 11467 11468 11469 11470 11471 11472
## [11473] 11473 11474 11475 11476 11477 11478 11479 11480 11481 11482 11483 11484
## [11485] 11485 11486 11487 11488 11489 11490 11491 11492 11493 11494 11495 11496
## [11497] 11497 11498 11499 11500 11501 11502 11503 11504 11505 11506 11507 11508

```

```

## [11509] 11509 11510 11511 11512 11513 11514 11515 11516 11517 11518 11519 11520
## [11521] 11521 11522 11523 11524 11525 11526 11527 11528 11529 11530 11531 11532
## [11533] 11533 11534 11535 11536 11537 11538 11539 11540 11541 11542 11543 11544
## [11545] 11545 11546 11547 11548 11549 11550 11551 11552 11553 11554 11555 11556
## [11557] 11557 11558 11559 11560 11561 11562 11563 11564 11565 11566 11567 11568
## [11569] 11569 11570 11571 11572 11573 11574 11575 11576 11577 11578 11579 11580
## [11581] 11581 11582 11583 11584 11585 11586 11587 11588 11589 11590 11591 11592
## [11593] 11593 11594 11595 11596 11597 11598 11599 11600 11601 11602 11603 11604
## [11605] 11605 11606 11607 11608 11609 11610 11611 11612 11613 11614 11615 11616
## [11617] 11617 11618 11619 11620 11621 11622 11623 11624 11625 11626 11627 11628
## [11629] 11629 11630 11631 11632 11633 11634 11635 11636 11637 11638 11639 11640
## [11641] 11641 11642 11643 11644 11645 11646 11647 11648 11649 11650 11651 11652
## [11653] 11653 11654 11655 11656 11657 11658 11659 11660 11661 11662 11663 11664
## [11665] 11665 11666 11667 11668 11669 11670 11671 11672 11673 11674 11675 11676
## [11677] 11677 11678 11679 11680 11681 11682 11683 11684 11685 11686 11687 11688
## [11689] 11689 11690 11691 11692 11693 11694 11695 11696 11697 11698 11699 11700
## [11701] 11701 11702 11703 11704 11705 11706 11707 11708 11709 11710 11711 11712
## [11713] 11713 11714 11715 11716 11717 11718 11719 11720 11721 11722 11723 11724
## [11725] 11725 11726 11727 11728 11729 11730 11731 11732 11733 11734 11735 11736
## [11737] 11737 11738 11739 11740 11741 11742 11743 11744 11745 11746 11747 11748
## [11749] 11749 11750 11751 11752 11753 11754 11755 11756 11757 11758 11759 11760
## [11761] 11761 11762 11763 11764 11765 11766 11767 11768 11769 11770 11771 11772
## [11773] 11773 11774 11775 11776 11777 11778 11779 11780 11781 11782 11783 11784
## [11785] 11785 11786 11787 11788 11789 11790 11791 11792 11793 11794 11795 11796
## [11797] 11797 11798 11799 11800 11801 11802 11803 11804 11805 11806 11807 11808
## [11809] 11809 11810 11811 11812 11813 11814 11815 11816 11817 11818 11819 11820
## [11821] 11821 11822 11823 11824 11825 11826 11827 11828 11829 11830 11831 11832
## [11833] 11833 11834 11835 11836 11837 11838 11839 11840 11841 11842 11843 11844
## [11845] 11845 11846 11847 11848 11849 11850 11851 11852 11853 11854 11855 11856
## [11857] 11857 11858 11859 11860 11861 11862 11863 11864 11865 11866 11867 11868
## [11869] 11869 11870 11871 11872 11873 11874 11875 11876 11877 11878 11879 11880
## [11881] 11881 11882 11883 11884 11885 11886 11887 11888 11889 11890 11891 11892
## [11893] 11893 11894 11895 11896 11897 11898 11899 11900 11901 11902 11903 11904
## [11905] 11905 11906 11907 11908 11909 11910 11911 11912 11913 11914 11915 11916
## [11917] 11917 11918 11919 11920 11921 11922 11923 11924 11925 11926 11927 11928
## [11929] 11929 11930 11931 11932 11933 11934 11935 11936 11937 11938 11939 11940
## [11941] 11941 11942 11943 11944 11945 11946 11947 11948 11949 11950 11951 11952
## [11953] 11953 11954 11955 11956 11957 11958 11959 11960 11961 11962 11963 11964
## [11965] 11965 11966 11967 11968 11969 11970 11971 11972 11973 11974 11975 11976
## [11977] 11977 11978 11979 11980 11981 11982 11983 11984 11985 11986 11987 11988
## [11989] 11989 11990 11991 11992 11993 11994 11995 11996 11997 11998 11999 12000
## [12001] 12001 12002 12003 12004 12005 12006 12007 12008 12009 12010 12011 12012
## [12013] 12013 12014 12015 12016 12017 12018 12019 12020 12021 12022 12023 12024
## [12025] 12025 12026 12027 12028 12029 12030 12031 12032 12033 12034 12035 12036
## [12037] 12037 12038 12039 12040 12041 12042 12043 12044 12045 12046 12047 12048
## [12049] 12049 12050 12051 12052 12053 12054 12055 12056 12057 12058 12059 12060
## [12061] 12061 12062 12063 12064 12065 12066 12067 12068 12069 12070 12071 12072
## [12073] 12073 12074 12075 12076 12077 12078 12079 12080 12081 12082 12083 12084
## [12085] 12085 12086 12087 12088 12089 12090 12091 12092 12093 12094 12095 12096
## [12097] 12097 12098 12099 12100 12101 12102 12103 12104 12105 12106 12107 12108
## [12109] 12109 12110 12111 12112 12113 12114 12115 12116 12117 12118 12119 12120
## [12121] 12121 12122 12123 12124 12125 12126 12127 12128 12129 12130 12131 12132
## [12133] 12133 12134 12135 12136 12137 12138 12139 12140 12141 12142 12143 12144
## [12145] 12145 12146 12147 12148 12149 12150 12151 12152 12153 12154 12155 12156

```

```

## [12157] 12157 12158 12159 12160 12161 12162 12163 12164 12165 12166 12167 12168
## [12169] 12169 12170 12171 12172 12173 12174 12175 12176 12177 12178 12179 12180
## [12181] 12181 12182 12183 12184 12185 12186 12187 12188 12189 12190 12191 12192
## [12193] 12193 12194 12195 12196 12197 12198 12199 12200 12201 12202 12203 12204
## [12205] 12205 12206 12207 12208 12209 12210 12211 12212 12213 12214 12215 12216
## [12217] 12217 12218 12219 12220 12221 12222 12223 12224 12225 12226 12227 12228
## [12229] 12229 12230 12231 12232 12233 12234 12235 12236 12237 12238 12239 12240
## [12241] 12241 12242 12243 12244 12245 12246 12247 12248 12249 12250 12251 12252
## [12253] 12253 12254 12255 12256 12257 12258 12259 12260 12261 12262 12263 12264
## [12265] 12265 12266 12267 12268 12269 12270 12271 12272 12273 12274 12275 12276
## [12277] 12277 12278 12279 12280 12281 12282 12283 12284 12285 12286 12287 12288
## [12289] 12289 12290 12291 12292 12293 12294 12295 12296 12297 12298 12299 12300
## [12301] 12301 12302 12303 12304 12305 12306 12307 12308 12309 12310 12311 12312
## [12313] 12313 12314 12315 12316 12317 12318 12319 12320 12321 12322 12323 12324
## [12325] 12325 12326 12327 12328 12329 12330 12331 12332 12333 12334 12335 12336
## [12337] 12337 12338 12339 12340 12341 12342 12343 12344 12345 12346 12347 12348
## [12349] 12349 12350 12351 12352 12353 12354 12355 12356 12357 12358 12359 12360
## [12361] 12361 12362 12363 12364 12365 12366 12367 12368 12369 12370 12371 12372
## [12373] 12373 12374 12375 12376 12377 12378 12379 12380 12381 12382 12383 12384
## [12385] 12385 12386 12387 12388 12389 12390 12391 12392 12393 12394 12395 12396
## [12397] 12397 12398 12399 12400 12401 12402 12403 12404 12405 12406 12407 12408
## [12409] 12409 12410 12411 12412 12413 12414 12415 12416 12417 12418 12419 12420
## [12421] 12421 12422 12423 12424 12425 12426 12427 12428 12429 12430 12431 12432
## [12433] 12433 12434 12435 12436 12437 12438 12439 12440 12441 12442 12443 12444
## [12445] 12445 12446 12447 12448 12449 12450 12451 12452 12453 12454 12455 12456
## [12457] 12457 12458 12459 12460 12461 12462 12463 12464 12465 12466 12467 12468
## [12469] 12469 12470 12471 12472 12473 12474 12475 12476 12477 12478 12479 12480
## [12481] 12481 12482 12483 12484 12485 12486 12487 12488 12489 12490 12491 12492
## [12493] 12493 12494 12495 12496 12497 12498 12499 12500 12501 12502 12503 12504
## [12505] 12505 12506 12507 12508 12509 12510 12511 12512 12513 12514 12515 12516
## [12517] 12517 12518 12519 12520 12521 12522 12523 12524 12525 12526 12527 12528
## [12529] 12529 12530 12531 12532 12533 12534 12535 12536 12537 12538 12539 12540
## [12541] 12541 12542 12543 12544 12545 12546 12547 12548 12549 12550 12551 12552
## [12553] 12553 12554 12555 12556 12557 12558 12559 12560 12561 12562 12563 12564
## [12565] 12565 12566 12567 12568 12569 12570 12571 12572 12573 12574 12575 12576
## [12577] 12577 12578 12579 12580 12581 12582 12583 12584 12585 12586 12587 12588
## [12589] 12589 12590 12591 12592 12593 12594 12595 12596 12597 12598 12599 12600
## [12601] 12601 12602 12603 12604 12605 12606 12607 12608 12609 12610 12611 12612
## [12613] 12613 12614 12615 12616 12617 12618 12619 12620 12621 12622 12623 12624
## [12625] 12625 12626 12627 12628 12629 12630 12631 12632 12633 12634 12635 12636
## [12637] 12637 12638 12639 12640 12641 12642 12643 12644 12645 12646 12647 12648
## [12649] 12649 12650 12651 12652 12653 12654 12655 12656 12657 12658 12659 12660
## [12661] 12661 12662 12663 12664 12665 12666 12667 12668 12669 12670 12671 12672
## [12673] 12673 12674 12675 12676 12677 12678 12679 12680 12681 12682 12683 12684
## [12685] 12685 12686 12687 12688 12689 12690 12691 12692 12693 12694 12695 12696
## [12697] 12697 12698 12699 12700 12701 12702 12703 12704 12705 12706 12707 12708
## [12709] 12709 12710 12711 12712 12713 12714 12715 12716 12717 12718 12719 12720
## [12721] 12721 12722 12723 12724 12725 12726 12727 12728 12729 12730 12731 12732
## [12733] 12733 12734 12735 12736 12737 12738 12739 12740 12741 12742 12743 12744
## [12745] 12745 12746 12747 12748 12749 12750 12751 12752 12753 12754 12755 12756
## [12757] 12757 12758 12759 12760 12761 12762 12763 12764 12765 12766 12767 12768
## [12769] 12769 12770 12771 12772 12773 12774 12775 12776 12777 12778 12779 12779
## [12781] 12781 12782 12783 12784 12785 12786 12787 12788 12789 12790 12791 12792
## [12793] 12793 12794 12795 12796 12797 12798 12799 12800 12801 12802 12803 12804

```

```

## [12805] 12805 12806 12807 12808 12809 12810 12811 12812 12813 12814 12815 12816
## [12817] 12817 12818 12819 12820 12821 12822 12823 12824 12825 12826 12827 12828
## [12829] 12829 12830 12831 12832 12833 12834 12835 12836 12837 12838 12839 12840
## [12841] 12841 12842 12843 12844 12845 12846 12847 12848 12849 12850 12851 12852
## [12853] 12853 12854 12855 12856 12857 12858 12859 12860 12861 12862 12863 12864
## [12865] 12865

##
## $names
## [1] "Sale Date"                      "Sale Price"
## [3] "sale_reason"                    "sale_instrument"
## [5] "sale_warning"                  "sitetype"
## [7] "addr_full"                     "zip5"
## [9] "ctyname"                       "postalctyn"
## [11] "lon"                            "lat"
## [13] "building_grade"                "square_feet_total_living"
## [15] "bedrooms"                      "bath_full_count"
## [17] "bath_half_count"               "bath_3qtr_count"
## [19] "year_built"                    "year_renovated"
## [21] "current_zoning"               "sq_ft_lot"
## [23] "prop_type"                     "present_use"

#Print the dimension of the dataframe
print(dim(raw_housing_df))

```

```
## [1] 12865    24
```

```
#Calculate the str for the dataframe
print(str(raw_housing_df))
```

```

## tibble [12,865 x 24] (S3: tbl_df/tbl/data.frame)
## $ Sale Date           : POSIXct[1:12865], format: "2006-01-03" "2006-01-03" ...
## $ Sale Price          : num [1:12865] 698000 649990 572500 420000 369900 ...
## $ sale_reason         : num [1:12865] 1 1 1 1 1 1 1 1 1 ...
## $ sale_instrument     : num [1:12865] 3 3 3 3 3 15 3 3 3 ...
## $ sale_warning        : chr [1:12865] NA NA NA NA ...
## $ sitetype             : chr [1:12865] "R1" "R1" "R1" "R1" ...
## $ addr_full            : chr [1:12865] "17021 NE 113TH CT" "11927 178TH PL NE" "13315 174TH AVE N ...
## $ zip5                 : num [1:12865] 98052 98052 98052 98052 98052 ...
## $ ctyname              : chr [1:12865] "REDMOND" "REDMOND" NA "REDMOND" ...
## $ postalctyn           : chr [1:12865] "REDMOND" "REDMOND" "REDMOND" "REDMOND" ...
## $ lon                  : num [1:12865] -122 -122 -122 -122 -122 ...
## $ lat                  : num [1:12865] 47.7 47.7 47.7 47.6 47.7 ...
## $ building_grade        : num [1:12865] 9 9 8 8 7 7 10 10 9 8 ...
## $ square_feet_total_living: num [1:12865] 2810 2880 2770 1620 1440 4160 3960 3720 4160 2760 ...
## $ bedrooms              : num [1:12865] 4 4 4 3 3 4 5 4 4 4 ...
## $ bath_full_count       : num [1:12865] 2 2 1 1 1 2 3 2 2 1 ...
## $ bath_half_count       : num [1:12865] 1 0 1 0 0 1 0 1 1 0 ...
## $ bath_3qtr_count       : num [1:12865] 0 1 1 1 1 1 0 1 1 ...
## $ year_built            : num [1:12865] 2003 2006 1987 1968 1980 ...
## $ year_renovated        : num [1:12865] 0 0 0 0 0 0 0 0 0 0 ...
## $ current_zoning        : chr [1:12865] "R4" "R4" "R6" "R4" ...
## $ sq_ft_lot              : num [1:12865] 6635 5570 8444 9600 7526 ...
## $ prop_type              : chr [1:12865] "R" "R" "R" "R" ...

```

```

## $ present_use : num [1:12865] 2 2 2 2 2 2 2 2 2 ...
## NULL

# Question b
# Explain any transformations or modifications you made to the data set

#Removing unwanted columns from data frame
remove_cols <- c(3,4,5,6,7,9,13,21,23,24)
clean_housing_df <- select(raw_housing_df, -all_of(remove_cols))
colnames(clean_housing_df)

## [1] "Sale Date"           "Sale Price"
## [3] "zip5"                "postalctyn"
## [5] "lon"                  "lat"
## [7] "square_feet_total_living" "bedrooms"
## [9] "bath_full_count"      "bath_half_count"
## [11] "bath_3qtr_count"     "year_built"
## [13] "year_renovated"       "sq_ft_lot"

#Renaming the column names to remove space in the column names
rename_housing_df <- rename(clean_housing_df, "sale_price" = "Sale Price", "sale_date" = "Sale Date")
colnames(rename_housing_df)

## [1] "sale_date"           "sale_price"
## [3] "zip5"                "postalctyn"
## [5] "lon"                  "lat"
## [7] "square_feet_total_living" "bedrooms"
## [9] "bath_full_count"      "bath_half_count"
## [11] "bath_3qtr_count"     "year_built"
## [13] "year_renovated"       "sq_ft_lot"

head(rename_housing_df, 10)

## # A tibble: 10 x 14
##   sale_date     sale_price zip5 postalctyn   lon   lat square_feet_tota...
##   <dttm>        <dbl> <dbl> <chr>     <dbl> <dbl>          <dbl>
## 1 2006-01-03 00:00:00 698000 98052 REDMOND -122. 47.7          2810
## 2 2006-01-03 00:00:00 649990 98052 REDMOND -122. 47.7          2880
## 3 2006-01-03 00:00:00 572500 98052 REDMOND -122. 47.7          2770
## 4 2006-01-03 00:00:00 420000 98052 REDMOND -122. 47.6          1620
## 5 2006-01-03 00:00:00 369900 98052 REDMOND -122. 47.7          1440
## 6 2006-01-03 00:00:00 184667 98053 REDMOND -122. 47.7          4160
## 7 2006-01-04 00:00:00 1050000 98053 REDMOND -122. 47.7          3960
## 8 2006-01-04 00:00:00 875000 98053 REDMOND -122. 47.7          3720
## 9 2006-01-04 00:00:00 660000 98053 REDMOND -122. 47.7          4160
## 10 2006-01-04 00:00:00 650000 98052 REDMOND -122. 47.6          2760
## # ... with 7 more variables: bedrooms <dbl>, bath_full_count <dbl>,
## #   bath_half_count <dbl>, bath_3qtr_count <dbl>, year_built <dbl>,
## #   year_renovated <dbl>, sq_ft_lot <dbl>

```

```

# Create two variables; one that will contain the variables Sale Price and Square Foot of Lot (same var
#Add addition columns to calculate price_per_sq_ft and housing size

housing_df <- transform(rename_housing_df,
  price_per_sq_ft=round(sale_price/square_feet_total_living,2),
  housing_size=case_when(square_feet_total_living <= 1000 ~ "Tiny",
  square_feet_total_living > 1000 & square_feet_total_living <= 2000 ~ "Small",
  square_feet_total_living > 2000 & square_feet_total_living <= 3000 ~ "Medium",
  square_feet_total_living > 3000 ~ "Large"))

colnames(housing_df)

## [1] "sale_date"           "sale_price"
## [3] "zip5"                "postalctyn"
## [5] "lon"                 "lat"
## [7] "square_feet_total_living" "bedrooms"
## [9] "bath_full_count"      "bath_half_count"
## [11] "bath_3qtr_count"      "year_built"
## [13] "year_renovated"       "sq_ft_lot"
## [15] "price_per_sq_ft"      "housing_size"

head(housing_df,10)

##   sale_date sale_price zip5 postalctyn      lon      lat
## 1 2006-01-03     698000 98052 REDMOND -122.1124 47.70139
## 2 2006-01-03     649990 98052 REDMOND -122.1022 47.70731
## 3 2006-01-03     572500 98052 REDMOND -122.1085 47.71986
## 4 2006-01-03     420000 98052 REDMOND -122.1037 47.63914
## 5 2006-01-03     369900 98052 REDMOND -122.1242 47.69748
## 6 2006-01-03     184667 98053 REDMOND -122.0341 47.67545
## 7 2006-01-04    1050000 98053 REDMOND -122.0507 47.68053
## 8 2006-01-04     875000 98053 REDMOND -122.0555 47.66510
## 9 2006-01-04     660000 98053 REDMOND -122.0227 47.67208
## 10 2006-01-04    650000 98052 REDMOND -122.1039 47.63341
##   square_feet_total_living bedrooms bath_full_count bath_half_count
## 1                  2810        4             2              1
## 2                  2880        4             2              0
## 3                  2770        4             1              1
## 4                  1620        3             1              0
## 5                  1440        3             1              0
## 6                  4160        4             2              1
## 7                  3960        5             3              0
## 8                  3720        4             2              1
## 9                  4160        4             2              1
## 10                 2760        4             1              0
##   bath_3qtr_count year_built year_renovated sq_ft_lot price_per_sq_ft
## 1                  0      2003            0      6635      248.40
## 2                  1      2006            0      5570      225.69
## 3                  1      1987            0      8444      206.68
## 4                  1      1968            0      9600      259.26
## 5                  1      1980            0      7526      256.88

```

```

## 6          1    2005        0    7280     44.39
## 7          1    1993        0   97574    265.15
## 8          0    1988        0   30649    235.22
## 9          1    1978        0   42688    158.65
## 10         1    1976        0  94889    235.51
## housing_size
## 1      Medium
## 2      Medium
## 3      Medium
## 4      Small
## 5      Small
## 6      Large
## 7      Large
## 8      Large
## 9      Large
## 10     Medium

```

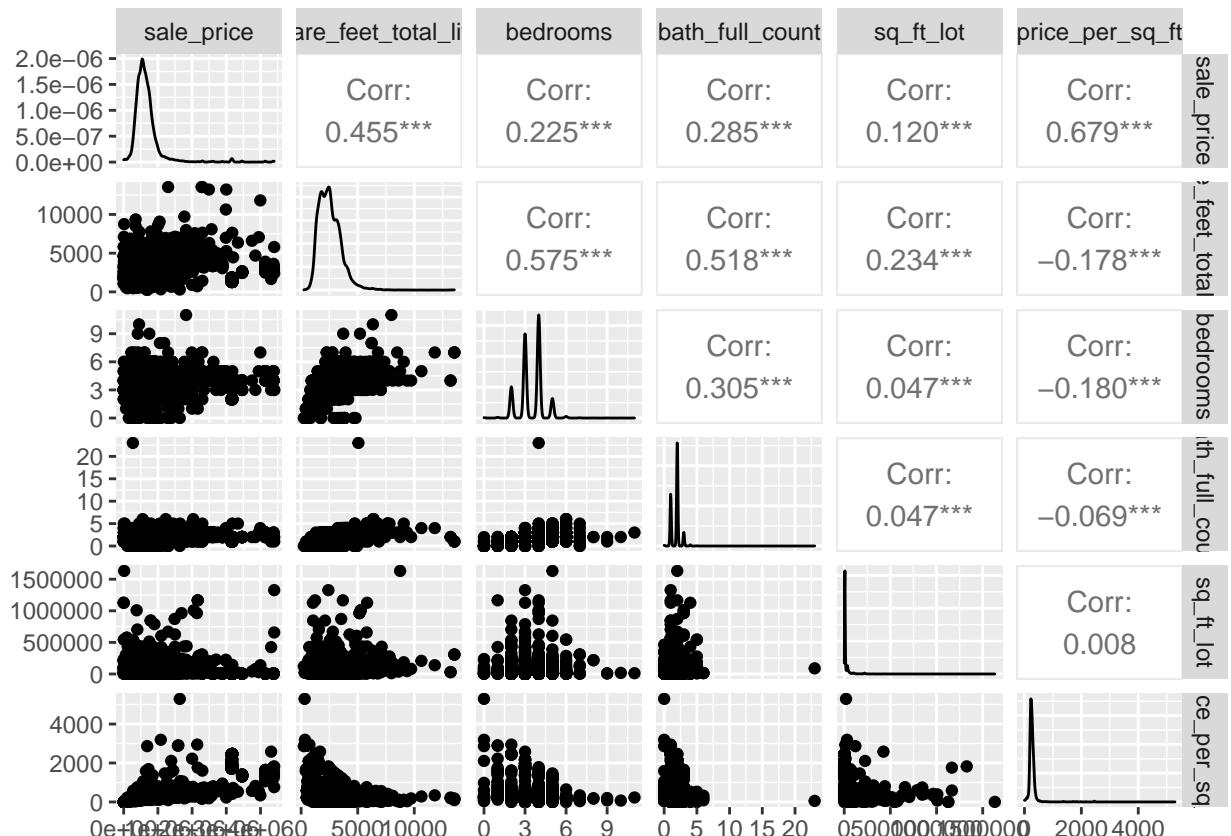
```
library(GGally)
```

```

## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2

```

```
ggpairs(data=housing_df,columns=c(2,7,8,9,14,15))
```



```

#Observation: From the above chart, We see square_feet_total_living is having strong correlation with "class"

sapply(housing_df, class)

## $sale_date
## [1] "POSIXct" "POSIXt"
##
## $sale_price
## [1] "numeric"
##
## $zip5
## [1] "numeric"
##
## $postalctyn
## [1] "character"
##
## $lon
## [1] "numeric"
##
## $lat
## [1] "numeric"
##
## $square_feet_total_living
## [1] "numeric"
##
## $bedrooms
## [1] "numeric"
##
## $bath_full_count
## [1] "numeric"
##
## $bath_half_count
## [1] "numeric"
##
## $bath_3qtr_count
## [1] "numeric"
##
## $year_built
## [1] "numeric"
##
## $year_renovated
## [1] "numeric"
##
## $sq_ft_lot
## [1] "numeric"
##
## $price_per_sq_ft
## [1] "numeric"
##
## $housing_size
## [1] "character"

```

```

# Simple Linear Regression

price_lm <- lm(sale_price ~ sq_ft_lot, housing_df)
price_lm


## 
## Call:
## lm(formula = sale_price ~ sq_ft_lot, data = housing_df)
## 
## Coefficients:
## (Intercept)    sq_ft_lot
##       6.418e+05     8.510e-01

zip_lm <- lm(sale_price ~ zip5, housing_df)
zip_lm


## 
## Call:
## lm(formula = sale_price ~ zip5, data = housing_df)
## 
## Coefficients:
## (Intercept)      zip5
## -1.406e+09     1.435e+04

sqft_lm <- lm(sale_price ~ square_feet_total_living, housing_df)
sqft_lm


## 
## Call:
## lm(formula = sale_price ~ square_feet_total_living, data = housing_df)
## 
## Coefficients:
## (Intercept) square_feet_total_living
##           189106.6             185.7

#Multiple Regression

multi_lm <- lm(sale_price ~ sq_ft_lot + bath_full_count + bedrooms, housing_df)
multi_lm


## 
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms,
##     data = housing_df)
## 
## Coefficients:
## (Intercept)    sq_ft_lot  bath_full_count    bedrooms
##       1.429e+05     7.227e-01     1.458e+05     6.887e+04

```

```

multitotsqft_lm <- lm(sale_price ~ sq_ft_lot + bath_full_count + bedrooms + square_feet_total_living,
multitotsqft_lm

## 
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##     square_feet_total_living, data = housing_df)
##
## Coefficients:
##             (Intercept)                 sq_ft_lot          bath_full_count
##             2.031e+05                  1.048e-01                  4.323e+04
##             bedrooms    square_feet_total_living
##             -2.432e+04                  1.820e+02

multisqftpice_lm <- lm(sale_price ~ sq_ft_lot + bath_full_count + bedrooms + square_feet_total_living +
multisqftpice_lm

## 
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##     square_feet_total_living + price_per_sq_ft, data = housing_df)
##
## Coefficients:
##             (Intercept)                 sq_ft_lot          bath_full_count
##             -4.721e+05                 -1.452e-01                  2.507e+04
##             bedrooms    square_feet_total_living      price_per_sq_ft
##             1.582e+04                  2.282e+02                  1.670e+03

# Execute a summary() function on two variables defined in the previous step to compare the model results

summary(price_lm)

## 
## Call:
## lm(formula = sale_price ~ sq_ft_lot, data = housing_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2016064 -194842 - 63293  91565 3735109
## 
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 6.418e+05 3.800e+03 168.90 <2e-16 ***
## sq_ft_lot 8.510e-01 6.217e-02 13.69 <2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 401500 on 12863 degrees of freedom
## Multiple R-squared: 0.01435, Adjusted R-squared: 0.01428
## F-statistic: 187.3 on 1 and 12863 DF, p-value: < 2.2e-16

```

```

summary(zip_lm)

##
## Call:
## lm(formula = sale_price ~ zip5, data = housing_df)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -6666635 -200429  -67984   87016 3747016
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.406e+09 2.059e+08 -6.831 8.82e-12 ***
## zip5        1.435e+04 2.100e+03  6.834 8.62e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 403700 on 12863 degrees of freedom
## Multiple R-squared:  0.003618, Adjusted R-squared:  0.00354
## F-statistic: 46.71 on 1 and 12863 DF, p-value: 8.621e-12

```

```
summary(sqft_lm)
```

```

##
## Call:
## lm(formula = sale_price ~ square_feet_total_living, data = housing_df)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -1800136 -120257  -41547   44028 3811745
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.891e+05 8.745e+03 21.62 <2e-16 ***
## square_feet_total_living 1.857e+02 3.208e+00 57.88 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 360200 on 12863 degrees of freedom
## Multiple R-squared:  0.2066, Adjusted R-squared:  0.2066
## F-statistic: 3351 on 1 and 12863 DF, p-value: < 2.2e-16

```

```
summary(multi_lm)
```

```

##
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms,
##      data = housing_df)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -1000000 -200000  -50000   50000 1000000
##
```

```

## -3566287 -153218 -51375 69545 3736381
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.429e+05 1.481e+04 9.649 <2e-16 ***
## sq_ft_lot    7.227e-01 5.910e-02 12.229 <2e-16 ***
## bath_full_count 1.458e+05 5.422e+03 26.888 <2e-16 ***
## bedrooms     6.887e+04 4.027e+03 17.099 <2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 381000 on 12861 degrees of freedom
## Multiple R-squared: 0.1127, Adjusted R-squared: 0.1125
## F-statistic: 544.3 on 3 and 12861 DF, p-value: < 2.2e-16

```

```
summary(multitotalsqft_lm)
```

```

##
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##      square_feet_total_living, data = housing_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1917207 -117118 -40819  44256 3789150
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.031e+05 1.404e+04 14.471 < 2e-16 ***
## sq_ft_lot    1.048e-01 5.776e-02  1.814 0.0697 .
## bath_full_count 4.323e+04 5.708e+03  7.574 3.87e-14 ***
## bedrooms     -2.432e+04 4.444e+03 -5.473 4.50e-08 ***
## square_feet_total_living 1.820e+02 4.515e+00 40.307 < 2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 359000 on 12860 degrees of freedom
## Multiple R-squared: 0.2122, Adjusted R-squared: 0.2119
## F-statistic: 865.9 on 4 and 12860 DF, p-value: < 2.2e-16

```

```
summary(multisqftpprice_lm)
```

```

##
## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##      square_feet_total_living + price_per_sq_ft, data = housing_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6789489 -29012     1576    27353 2280000
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
```

```

## (Intercept) -4.721e+05 7.782e+03 -60.665 < 2e-16 ***
## sq_ft_lot -1.452e-01 2.879e-02 -5.045 4.60e-07 ***
## bath_full_count 2.507e+04 2.844e+03 8.816 < 2e-16 ***
## bedrooms 1.582e+04 2.222e+03 7.121 1.13e-12 ***
## square_feet_total_living 2.282e+02 2.260e+00 100.945 < 2e-16 ***
## price_per_sq_ft 1.670e+03 8.455e+00 197.494 < 2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Residual standard error: 178800 on 12859 degrees of freedom
## Multiple R-squared: 0.8047, Adjusted R-squared: 0.8046
## F-statistic: 1.059e+04 on 5 and 12859 DF, p-value: < 2.2e-16

summary(price_lm)$r.squared

## [1] 0.01435497

summary(price_lm)$adj.r.squared

## [1] 0.01427835

summary(zip_lm)$r.squared

## [1] 0.003617862

summary(zip_lm)$adj.r.squared

## [1] 0.003540401

summary(sqft_lm)$r.squared

## [1] 0.2066499

summary(sqft_lm)$adj.r.squared

## [1] 0.2065882

summary(multi_lm)$r.squared

## [1] 0.1126625

summary(multi_lm)$adj.r.squared

## [1] 0.1124555

```

```

summary(multitotalsqft_lm)$r.squared

## [1] 0.2121903

summary(multitotalsqft_lm)$adj.r.squared

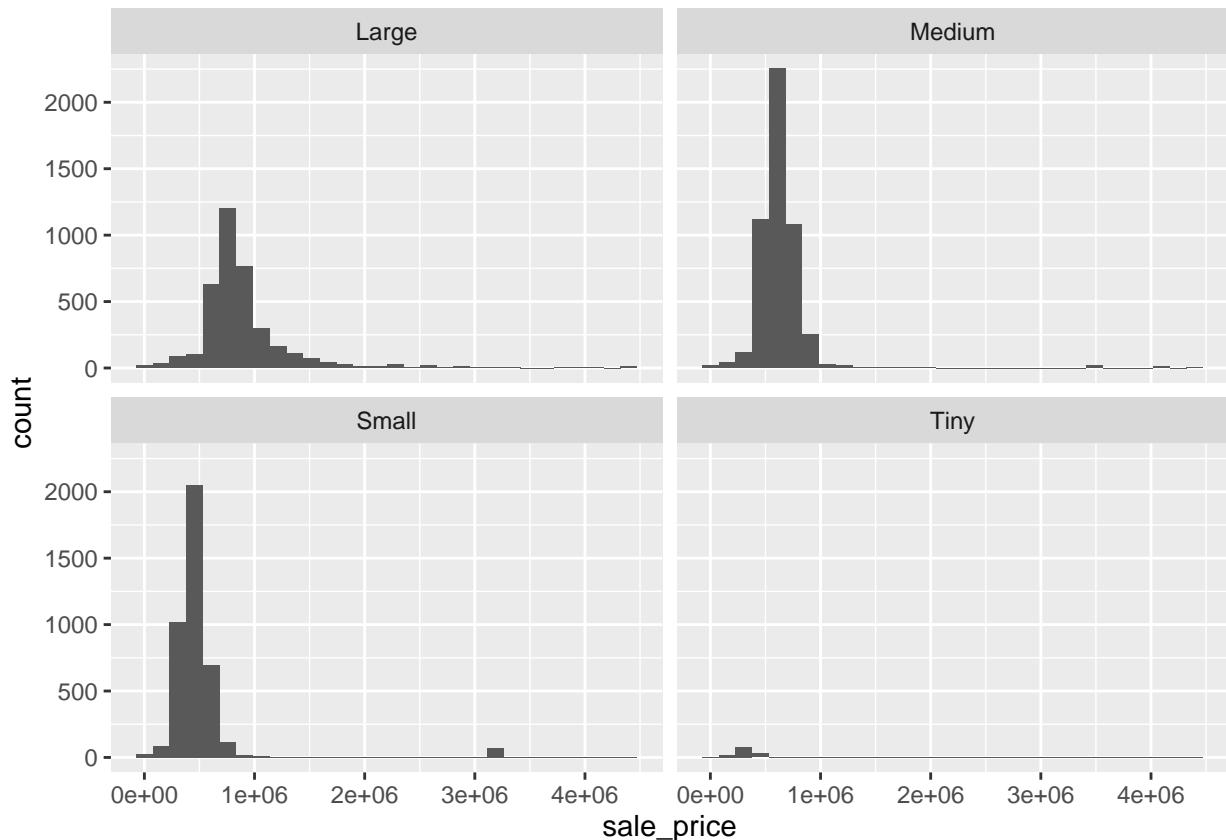
## [1] 0.2119453

price_summary <- housing_df |> group_by(housing_size) |> summarize(mean_by_size=mean(sale_price))
price_summary

## # A tibble: 4 x 2
##   housing_size mean_by_size
##   <chr>           <dbl>
## 1 Large            890808.
## 2 Medium           636017.
## 3 Small             495161.
## 4 Tiny              432586.

ggplot(housing_df,aes(sale_price)) + geom_histogram(bins=30) + facet_wrap(vars(housing_size))

```



```

#Observation: From r2 and adjusted r2, there is none of the models performed well. However, some perform better than others. For example, sqft_lm has an r^2 of 0.206, while multisqft_lm has an r^2 of 0.2121. This suggests that the model with more variables is not necessarily better.

#Out of above 2, I see square_feet_total_living (0.206 for sqft_lm) performs significantly well compared to multisqft_lm which has an r^2 of 0.2121. This suggests that the model with more variables is not necessarily better.

#multisqft_lm is performing well with r^2 as .2121 and adj.r^2 as .219

# 4. Considering the parameters of the multiple regression model you have created. What are the standard errors of the coefficients? How do they compare to the standard errors of the coefficients in the simple regression model you created in question 3?

library(lm.beta)

models <- list(price_lm, zip_lm, sqft_lm, multi_lm, multisqftprice_lm, multitotalsqft_lm)

sapply(models, lm.beta)

## [,1] [,2]
## coefficients numeric,2 numeric,2
## residuals numeric,12865 numeric,12865
## effects numeric,12865 numeric,12865
## rank 2 2
## fitted.values numeric,12865 numeric,12865
## assign integer,2 integer,2
## qr qr,5 qr,5
## df.residual 12863 12863
## xlevels list,0 list,0
## call expression expression
## terms sale_price ~ sq_ft_lot sale_price ~ zip5
## model data.frame,2 data.frame,2
## standardized.coefficients numeric,2 numeric,2
## [,3]
## coefficients numeric,2
## residuals numeric,12865
## effects numeric,12865
## rank 2
## fitted.values numeric,12865
## assign integer,2
## qr qr,5
## df.residual 12863
## xlevels list,0
## call expression
## terms sale_price ~ square_feet_total_living
## model data.frame,2
## standardized.coefficients numeric,2
## [,4]
## coefficients numeric,4
## residuals numeric,12865
## effects numeric,12865
## rank 4
## fitted.values numeric,12865
## assign integer,4
## qr qr,5
## df.residual 12861
## xlevels list,0
## call expression

```

```

## terms
## model
## standardized.coefficients numeric,4
## [5]
## coefficients numeric,6
## residuals numeric,12865
## effects numeric,12865
## rank 6
## fitted.values numeric,12865
## assign integer,6
## qr qr,5
## df.residual 12859
## xlevels list,0
## call expression
## terms terms,3
## model data.frame,6
## standardized.coefficients numeric,6
## [6]
## coefficients numeric,5
## residuals numeric,12865
## effects numeric,12865
## rank 5
## fitted.values numeric,12865
## assign integer,5
## qr qr,5
## df.residual 12860
## xlevels list,0
## call expression
## terms sale_price ~ sq_ft_lot + bath_full_count + bedrooms + square_feet_total_living
## model data.frame,5
## standardized.coefficients numeric,5

print("Multisq_lm betas")

## [1] "Multisq_lm betas"

print(lm.beta(multisqftprice_lm))

## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##     square_feet_total_living + price_per_sq_ft, data = housing_df)
## 
## Standardized Coefficients:
##             (Intercept)          sq_ft_lot      bath_full_count
##             0.000000000        -0.02044829        0.04034341
##             bedrooms square_feet_total_living    price_per_sq_ft
##             0.03428435         0.55848919        0.78689830

print(lm.beta(multitotalsqft_lm))

##

```

```

## Call:
## lm(formula = sale_price ~ sq_ft_lot + bath_full_count + bedrooms +
##     square_feet_total_living, data = housing_df)
##
## Standardized Coefficients::
##             (Intercept)          sq_ft_lot      bath_full_count
##             0.000000000        0.01475150        0.06957036
##             bedrooms square_feet_total_living
##             -0.05269668        0.44543067

#Observation: The standardized betas are the coefficient printed above. The values indicate that for ev

# 5. Calculate the confidence intervals for the parameters in your model and explain what the results i

confint(multisqftpprice_lm)

##                                2.5 %      97.5 %
## (Intercept)      -4.873156e+05 -4.568098e+05
## sq_ft_lot       -2.016695e-01 -8.880732e-02
## bath_full_count 1.949407e+04  3.064176e+04
## bedrooms         1.146838e+04  2.017985e+04
## square_feet_total_living 2.237352e+02  2.325962e+02
## price_per_sq_ft 1.653205e+03  1.686351e+03

min(housing_df$sale_price)

## [1] 698

max(housing_df$sale_price)

## [1] 4400000

# Observation: Square feet total living has the best margin of error, indicating that it is the best pr

# 6. Assess the improvement of the new model compared to your original model (simple regression model) b

anova(price_lm, multisqftpprice_lm)

## Analysis of Variance Table
##
## Model 1: sale_price ~ sq_ft_lot
## Model 2: sale_price ~ sq_ft_lot + bath_full_count + bedrooms + square_feet_total_living +
##   price_per_sq_ft
##   Res.Df      RSS Df  Sum of Sq      F    Pr(>F)
## 1 12863 2.0734e+15
## 2 12859 4.1089e+14  4 1.6625e+15 13007 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

#Observation: With an F score of 13007 and p-value of 2.2e-16 (much less than 0), the changes made by t

# 7. Perform case wise diagnostics to identify outliers and/or influential cases, storing each function

residuals <- resid(multisqftprice_lm)
stand_res <- rstandard(multisqftprice_lm)
student_res <- rstudent(multisqftprice_lm)
cooks_distance <- cooks.distance(multisqftprice_lm)
dfbeta <- dfbeta(multisqftprice_lm)
dffit <- dffits(multisqftprice_lm)
leverage <- hatvalues(multisqftprice_lm)
covariance_ratios <- covratio(multisqftprice_lm)

diag_df <- data.frame(residuals, stand_res, student_res, cooks_distance, dfbeta, dffit, leverage, covariance_ratios)

# 8. Calculate the standardized residuals using the appropriate command, specifying those that are +/-2

diag_df$large.residual <- diag_df$stand_res > 2 | diag_df$stand_res < -2

# 9. Use the appropriate function to show the sum of large residuals.

sum(diag_df$large.residual)

## [1] 356

# 10. Which specific variables have large residuals (only cases that evaluate as TRUE)?

colnames(diag_df)

## [1] "residuals"           "stand_res"
## [3] "student_res"         "cooks_distance"
## [5] "X.Intercept."        "sq_ft_lot"
## [7] "bath_full_count"     "bedrooms"
## [9] "square_feet_total_living" "price_per_sq_ft"
## [11] "dffit"                "leverage"
## [13] "covariance_ratios"   "large.residual"

lrg_residuals <- diag_df[diag_df$large.residual,]
lrg_residuals

##      residuals  stand_res student_res cooks_distance X.Intercept.
## 6    -478936.2 -2.679861   -2.680505  5.302677e-04  -49.407887
## 25   -622654.1 -3.485466   -3.486978  2.571517e-03  222.987387
## 92   -465305.8 -2.604265   -2.604851  1.085535e-03  237.000001
## 115  -1797476.0 -10.099494  -10.139395  1.492540e-01  491.147043
## 172  -361844.1 -2.024676   -2.024920  3.008999e-04   61.362134
## 178  -743793.2 -4.163537   -4.166184  3.619159e-03  512.172821
## 222  -409494.3 -2.291259   -2.291638  3.544852e-04  -28.225799
## 239   423917.6  2.372429    2.372856  7.494374e-04  170.367023
## 246  -1028159.3 -5.763152   -5.770385  2.199971e-02  488.337668
## 261   464646.0  2.623297    2.623897  2.125259e-02 -220.166347

```

## 287	-608134.7	-3.403195	-3.404596	1.321970e-03	-75.611749
## 295	-1128381.1	-6.675898	-6.687237	8.801152e-01	5801.579773
## 300	-1008564.6	-5.652942	-5.659759	2.045682e-02	7.851973
## 341	-469376.3	-2.626463	-2.627066	5.920153e-04	-37.626438
## 359	-657014.5	-3.678101	-3.679894	3.225114e-03	-57.267024
## 385	762619.6	4.270524	4.273390	6.093647e-03	-124.944447
## 396	656790.6	3.676384	3.678175	2.652846e-03	-318.136301
## 459	-625053.4	-3.502657	-3.504193	7.000915e-03	1048.223756
## 475	390155.3	2.183219	2.183539	4.444424e-04	-29.176878
## 482	-817059.4	-4.578637	-4.582196	1.199604e-02	1212.867698
## 508	-430666.0	-2.412188	-2.412641	2.380215e-03	78.360833
## 528	-700531.8	-3.920959	-3.923152	2.668840e-03	320.537659
## 576	-415301.5	-2.324849	-2.325247	1.215804e-03	82.579716
## 656	404003.5	2.260997	2.261358	6.924462e-04	-68.429406
## 661	552086.2	3.094031	3.095063	5.736900e-03	-167.079289
## 662	364006.4	2.037479	2.037729	7.836860e-04	-126.076421
## 670	953449.5	5.336187	5.341898	4.263541e-03	-324.207413
## 679	-1352657.0	-7.578798	-7.595486	2.977055e-02	1477.258729
## 742	-426784.7	-2.388225	-2.388662	5.611875e-04	-24.005710
## 782	-504521.0	-2.824388	-2.825155	1.879642e-03	-430.284726
## 784	-539532.7	-3.021282	-3.022237	3.051313e-03	-153.822329
## 802	-423226.1	-2.369189	-2.369614	1.245220e-03	83.445017
## 811	1208279.8	6.763826	6.775627	1.006827e-02	-416.195427
## 814	-566877.1	-3.174586	-3.175707	3.560322e-03	-452.179099
## 853	436714.2	2.444111	2.444584	8.497820e-04	8.711946
## 877	-592619.5	-3.317521	-3.318813	2.531156e-03	88.937386
## 916	-1102920.2	-6.179130	-6.188083	1.892597e-02	966.217960
## 971	357615.3	2.011429	2.011668	7.338257e-03	-43.917364
## 998	-425375.6	-2.380396	-2.380828	6.014777e-04	221.168701
## 1009	-480472.5	-2.688490	-2.689141	5.634264e-04	62.299021
## 1099	-366188.2	-2.049747	-2.050002	8.309295e-04	-6.816253
## 1119	-925867.0	-5.184178	-5.189402	8.112489e-03	272.287961
## 1141	-398331.5	-2.229343	-2.229687	7.396733e-04	22.345711
## 1142	-821566.0	-4.599004	-4.602612	4.596649e-03	69.681976
## 1155	-729959.6	-4.103198	-4.105727	2.707558e-02	1000.148271
## 1179	385504.0	2.157381	2.157688	5.704496e-04	-64.445884
## 1207	-813811.7	-4.562722	-4.566242	1.540118e-02	58.824983
## 1345	-455238.7	-2.547359	-2.547903	5.612469e-04	224.591329
## 1368	-437479.8	-2.448812	-2.449288	1.192847e-03	84.292004
## 1380	-414981.1	-2.322071	-2.322468	4.505301e-04	-191.847496
## 1387	-429637.9	-2.404391	-2.404838	7.287859e-04	124.143686
## 1442	-3844728.8	-21.715578	-22.124192	1.522882e+00	3879.395535
## 1486	-440247.6	-2.463892	-2.464378	8.689048e-04	-121.207141
## 1492	-546075.1	-3.056701	-3.057693	1.881858e-03	203.326096
## 1504	-1063116.8	-5.956847	-5.964851	1.901599e-02	481.402949
## 1543	-385137.9	-2.156166	-2.156472	1.169603e-03	81.760284
## 1550	-687812.3	-3.849610	-3.851681	2.371999e-03	81.089508
## 1633	-368162.9	-2.060035	-2.060295	3.134076e-04	88.417408
## 1650	-1507860.0	-8.459300	-8.482607	6.802771e-02	-28.001170
## 1716	-678639.8	-3.797711	-3.799694	1.596564e-03	-90.807376
## 1745	656099.4	3.672129	3.673913	2.174104e-03	-285.277720
## 1870	416088.4	2.335326	2.335730	5.978306e-03	-328.587752
## 1904	-525858.6	-2.942705	-2.943582	9.266789e-04	258.072678
## 1959	-372712.3	-2.086316	-2.086588	8.957805e-04	-239.394514

## 1962	857855.9	4.802137	4.806262	4.991903e-03	-443.782931
## 1963	432452.0	2.419948	2.420405	5.831651e-04	95.540102
## 1964	-2949282.5	-16.624435	-16.805364	7.036638e-01	3903.544464
## 1976	925807.9	5.181682	5.186899	4.361510e-03	-986.011719
## 1977	908643.7	5.085229	5.090152	3.545697e-03	-538.840634
## 1978	906512.6	5.073571	5.078459	3.983699e-03	-709.584311
## 1979	915154.6	5.121631	5.126664	3.534656e-03	-533.951228
## 1980	886643.1	4.962530	4.967096	4.084244e-03	-719.749787
## 1981	922911.9	5.166360	5.171529	5.863856e-03	-1268.801326
## 1982	913937.6	5.115397	5.120411	4.510441e-03	-997.830385
## 2020	477597.7	2.674411	2.675051	2.349210e-03	16.359567
## 2022	-956104.1	-5.358765	-5.364550	1.813378e-02	52.415619
## 2099	514897.0	2.881530	2.882349	1.048074e-03	-219.285620
## 2115	-443159.9	-2.480070	-2.480566	7.794924e-04	78.551910
## 2137	487586.9	2.728550	2.729234	8.093061e-04	52.945110
## 2157	429283.7	2.401870	2.402316	2.956387e-04	-159.475387
## 2167	-563675.3	-3.158066	-3.159168	5.012321e-03	166.039430
## 2243	452412.3	2.533290	2.533823	2.031804e-03	73.555894
## 2302	-848889.3	-4.760184	-4.764199	1.803175e-02	1695.887498
## 2360	456471.0	2.554406	2.554955	6.935262e-04	104.207708
## 2361	-6789489.1	-39.073404	-41.620713	1.483646e+01	20744.456555
## 2379	-855281.0	-4.789603	-4.793694	7.972416e-03	-508.798036
## 2469	474195.2	2.653568	2.654192	7.286259e-04	79.127721
## 2534	-456675.3	-2.555782	-2.556332	8.921500e-04	244.229793
## 2684	862288.1	4.826621	4.830812	4.517266e-03	-985.569101
## 2685	907704.5	5.080046	5.084954	3.661845e-03	-666.657381
## 2686	945753.6	5.293052	5.298622	4.083425e-03	-683.109685
## 2687	887544.6	4.967372	4.971951	3.754146e-03	-685.498327
## 2688	887654.4	4.967724	4.972305	3.320075e-03	-521.822551
## 2689	946832.1	5.299028	5.304617	3.986851e-03	-706.177749
## 2690	921750.3	5.158663	5.163809	3.790834e-03	-886.944746
## 2699	-462851.6	-2.621014	-2.621612	2.823093e-02	170.519703
## 2708	743456.1	4.160755	4.163396	2.371751e-03	-659.141184
## 2709	735950.6	4.119054	4.121614	2.742603e-03	-363.110935
## 2710	752412.4	4.211206	4.213949	2.888712e-03	-389.877714
## 2717	925069.3	5.178759	5.183966	6.448560e-03	-489.430908
## 2742	-550146.1	-3.078474	-3.079489	8.666420e-04	58.338578
## 2852	1016794.0	5.710048	5.717078	4.191244e-02	-1532.343082
## 2934	-678323.5	-3.795940	-3.797921	1.594820e-03	-90.697496
## 2937	-666519.3	-3.729876	-3.731750	1.530857e-03	-86.699428
## 3065	361498.5	2.024324	2.024568	1.370221e-03	-193.030082
## 3097	894538.9	5.007517	5.012212	5.485843e-03	-469.184362
## 3102	596682.6	3.339226	3.340545	1.405478e-03	-272.339360
## 3168	-813330.3	-4.573992	-4.577540	3.696822e-02	1009.923982
## 3169	-838398.3	-4.714872	-4.718769	3.912721e-02	1230.482636
## 3175	-414235.4	-2.326637	-2.327037	7.271296e-03	644.285364
## 3182	-813304.3	-4.573845	-4.577392	3.696450e-02	1009.927215
## 3183	-813351.5	-4.574112	-4.577660	3.697126e-02	1009.921344
## 3184	-813351.5	-4.574112	-4.577660	3.697126e-02	1009.921344
## 3185	-813301.3	-4.573828	-4.577375	3.696407e-02	1009.927594
## 3186	-813330.3	-4.573992	-4.577540	3.696822e-02	1009.923982
## 3187	-813330.3	-4.573992	-4.577540	3.696822e-02	1009.923982
## 3188	-838207.7	-4.713796	-4.717690	3.910134e-02	1230.471511
## 3189	-414272.8	-2.326847	-2.327247	7.272877e-03	644.317422

## 3191	-414287.9	-2.326932	-2.327332	7.273517e-03	644.330394
## 3198	-813251.6	-4.573547	-4.577093	3.695698e-02	1009.933769
## 3199	-813256.0	-4.573572	-4.577118	3.695760e-02	1009.933228
## 3200	-813351.5	-4.574112	-4.577660	3.697126e-02	1009.921344
## 3201	-813351.5	-4.574112	-4.577660	3.697126e-02	1009.921344
## 3202	-813351.5	-4.574112	-4.577660	3.697126e-02	1009.921344
## 3260	393345.9	2.201129	2.201459	4.930493e-04	-307.965937
## 3357	-485037.4	-2.715139	-2.715812	1.576630e-03	530.746367
## 3424	-631384.3	-3.533099	-3.534678	1.185433e-03	51.772127
## 3464	-410694.9	-2.306587	-2.306974	7.019077e-03	632.229276
## 3468	-410654.6	-2.306360	-2.306748	7.017417e-03	632.195119
## 3474	-410562.9	-2.305844	-2.306231	7.013644e-03	632.117176
## 3478	-805991.2	-4.532299	-4.535747	3.565585e-02	986.318964
## 3479	-805991.2	-4.532299	-4.535747	3.565585e-02	986.318964
## 3480	-805991.2	-4.532299	-4.535747	3.565585e-02	986.318964
## 3481	-805991.2	-4.532299	-4.535747	3.565585e-02	986.318964
## 3482	-805991.2	-4.532299	-4.535747	3.565585e-02	986.318964
## 3483	-805991.1	-4.532298	-4.535746	3.565583e-02	986.318983
## 3484	-831059.6	-4.673171	-4.676962	3.775949e-02	1204.735551
## 3494	-410644.8	-2.306305	-2.306692	7.017010e-03	632.186734
## 3495	-805991.1	-4.532298	-4.535746	3.565583e-02	986.318983
## 3496	-805991.1	-4.532298	-4.535746	3.565583e-02	986.318983
## 3497	-805991.1	-4.532298	-4.535746	3.565583e-02	986.318983
## 3523	589657.0	3.299558	3.300828	9.863622e-04	-320.701374
## 3710	-389703.4	-2.180390	-2.180708	2.245690e-04	-31.325529
## 3810	-422257.5	-2.362683	-2.363104	3.840371e-04	101.703933
## 3837	-566804.4	-3.171780	-3.172898	1.015299e-03	-57.844904
## 3918	-763175.4	-4.273183	-4.276054	5.453941e-03	248.526865
## 3919	-680401.3	-3.808751	-3.810753	3.109801e-03	77.891572
## 4055	635479.3	3.556694	3.558307	2.008329e-03	-48.596586
## 4056	-1482703.2	-8.329607	-8.351845	9.796765e-02	1004.691764
## 4200	-358586.7	-2.006766	-2.007002	5.075634e-04	-18.272976
## 4285	-541657.2	-3.030961	-3.031927	8.288557e-04	253.498678
## 4435	-511718.1	-2.863379	-2.864181	6.905668e-04	-55.035529
## 4571	-367284.7	-2.055492	-2.055750	5.663791e-04	-248.780926
## 4648	2280000.5	12.822820	12.905094	2.931117e-01	-701.254154
## 4649	1393823.4	7.990828	8.010431	5.347371e-01	-1903.671753
## 4671	-845134.8	-4.737102	-4.741056	1.464046e-02	798.000358
## 4696	699235.4	3.913666	3.915846	2.610411e-03	-308.620729
## 4821	-1023692.5	-5.738663	-5.745802	2.286696e-02	116.938505
## 4834	-883443.8	-4.950341	-4.954872	1.352477e-02	-27.275106
## 4840	-746809.3	-4.197925	-4.200641	2.835931e-02	1019.503335
## 4934	474300.2	2.653966	2.654590	5.604309e-04	-113.793636
## 4955	-401356.7	-2.247376	-2.247731	1.579201e-03	-20.224070
## 4956	-401356.7	-2.247376	-2.247731	1.579201e-03	-20.224070
## 5024	-621189.8	-3.477954	-3.479456	3.356136e-03	-253.396155
## 5083	-857500.6	-4.872748	-4.877064	1.259052e-01	470.487433
## 5363	-1134324.0	-6.355499	-6.365256	2.093170e-02	-77.935804
## 5491	360005.0	2.014227	2.014466	1.912965e-04	-130.834437
## 5494	363006.0	2.031011	2.031258	1.902759e-04	-128.498796
## 5495	359809.4	2.013134	2.013373	1.920914e-04	-130.645239
## 5496	359982.5	2.014101	2.014340	1.913848e-04	-130.812659
## 5498	371629.6	2.079258	2.079527	1.984896e-04	-103.221499
## 5549	-384049.9	-2.149625	-2.149927	8.397311e-04	-247.459927

## 5559	402527.7	2.253378	2.253736	1.169916e-03	-158.127180
## 5648	-436307.8	-2.441518	-2.441989	5.884928e-04	-25.836770
## 5935	-792219.7	-4.435461	-4.438685	5.361232e-03	-203.070975
## 6230	1035842.5	5.797722	5.805089	5.815174e-03	-689.768410
## 6231	1074260.6	6.012489	6.020724	5.726868e-03	-658.840871
## 6232	1075712.0	6.020798	6.029068	6.115119e-03	-854.648879
## 6233	996358.4	5.577012	5.583552	5.913691e-03	-710.526812
## 6234	1024156.5	5.732986	5.740104	6.972358e-03	-1039.843778
## 6235	1020039.1	5.709977	5.717008	6.991002e-03	-1041.081580
## 6236	1024169.1	5.733057	5.740174	6.971847e-03	-1039.878247
## 6237	1020032.9	5.709943	5.716973	6.991246e-03	-1041.064552
## 6238	971900.8	5.440298	5.446358	5.963844e-03	-719.224833
## 6239	1074249.8	6.012430	6.020664	5.727661e-03	-658.814963
## 6369	-388641.6	-2.174628	-2.174943	3.530144e-04	61.862111
## 6422	-365798.8	-2.048281	-2.048535	1.317691e-03	61.281239
## 6429	1766222.4	9.894509	9.932005	4.593922e-02	-1921.435363
## 6430	1195326.1	6.704844	6.716334	4.026756e-02	-1826.968383
## 6431	1452738.3	8.143720	8.164485	4.575912e-02	-1948.700061
## 6432	1623609.0	9.098172	9.127243	4.673225e-02	-1963.164048
## 6433	1708091.0	9.571194	9.605096	5.047982e-02	-2527.273248
## 6434	1708105.0	9.571272	9.605175	5.047821e-02	-2527.334252
## 6435	1853176.5	10.381016	10.424385	4.842847e-02	-2869.934097
## 6436	1496922.9	8.390549	8.413285	4.615991e-02	-1961.599380
## 6437	1289539.1	7.231632	7.246100	4.279066e-02	-1884.194947
## 6438	1201135.8	6.736998	6.748657	3.967535e-02	-1416.268391
## 6439	1704277.9	9.548655	9.582315	4.649719e-02	-1944.893410
## 6440	1787994.4	10.016317	10.055230	4.653941e-02	-2270.778193
## 6441	1568258.9	8.789528	8.815708	4.808508e-02	-2284.358608
## 6442	1678415.5	9.404247	9.436387	4.665068e-02	-1951.622989
## 6443	1413060.1	7.920073	7.939152	4.004419e-02	-2496.077861
## 6444	1576872.9	8.834872	8.861464	3.991348e-02	-2566.275368
## 6445	1147534.6	6.434784	6.444918	3.280466e-02	-1864.419234
## 6446	1469062.4	8.231698	8.253152	3.702967e-02	-2023.938156
## 6447	1674700.7	9.380922	9.412821	3.854757e-02	-2572.619006
## 6448	1231481.5	6.903590	6.916150	3.331026e-02	-1670.978245
## 6449	1739114.2	9.740335	9.776087	3.699271e-02	-2212.759105
## 6450	1819056.5	10.186588	10.227541	3.541238e-02	-2151.846655
## 6451	1156087.6	6.482612	6.492978	3.300578e-02	-1870.882120
## 6452	1480056.4	8.293106	8.315050	3.704217e-02	-2025.591369
## 6453	1723151.9	9.651298	9.686068	3.749145e-02	-2562.510241
## 6454	1610753.2	9.024004	9.052361	3.955283e-02	-2572.165966
## 6455	1370369.3	7.681575	7.698961	3.967462e-02	-2468.426451
## 6456	1308848.4	7.336029	7.351142	3.448616e-02	-1701.015203
## 6457	1647849.7	9.230860	9.261236	3.838957e-02	-2243.048498
## 6512	857876.7	4.801364	4.805487	3.565435e-03	-435.790261
## 6527	-598021.5	-3.347748	-3.349078	2.561793e-03	8.487053
## 6545	-442339.2	-2.475099	-2.475592	4.640751e-04	63.795137
## 6587	-377245.9	-2.117924	-2.118211	5.346409e-03	-42.507032
## 6739	-516699.7	-2.892509	-2.893338	1.916036e-03	-8.449175
## 6740	-390249.9	-2.184538	-2.184858	1.020233e-03	-8.198869
## 6746	-546496.1	-3.060326	-3.061322	3.181916e-03	525.514785
## 6767	441886.5	2.499419	2.499929	2.322238e-02	-263.769588
## 6796	-445372.5	-2.492085	-2.492590	4.820166e-04	61.078536
## 6821	-576046.3	-3.224031	-3.225210	1.624086e-03	-4.319858

## 6915	-546496.1	-3.060326	-3.061322	3.181916e-03	525.514785
## 6924	-391959.7	-2.194725	-2.195051	1.481435e-03	64.019210
## 6931	-465721.8	-2.605851	-2.606438	4.411915e-04	-48.893124
## 6938	786335.6	4.400230	4.403375	1.919029e-03	-303.516514
## 6939	749541.9	4.194675	4.197384	2.216197e-03	-389.421149
## 6940	749897.4	4.196337	4.199050	1.759618e-03	-373.331267
## 6941	751282.5	4.204077	4.206806	1.751170e-03	-372.783126
## 6942	742256.6	4.153883	4.156511	2.143493e-03	-670.011598
## 6943	717427.7	4.015958	4.018322	3.377258e-03	-809.474924
## 6944	749050.0	4.192122	4.194826	2.492300e-03	-470.621724
## 6945	786335.6	4.400230	4.403375	1.919029e-03	-303.516514
## 6946	751037.1	4.202710	4.205436	1.758228e-03	-372.352483
## 6947	737705.9	4.128161	4.130739	1.766879e-03	-383.380161
## 6948	730911.9	4.090169	4.092673	1.770314e-03	-388.306816
## 7039	459051.0	2.569398	2.569958	1.176927e-03	-188.531326
## 7066	-402485.5	-2.252181	-2.252537	4.464066e-04	203.096648
## 7147	-730790.3	-4.089861	-4.092365	2.278502e-03	325.654055
## 7167	1345884.1	7.533155	7.549539	1.006204e-02	-674.628966
## 7210	909360.2	5.090510	5.095449	5.712531e-03	-570.785105
## 7211	862917.4	4.830697	4.834898	5.416347e-03	-955.715939
## 7388	-421291.7	-2.358153	-2.358571	1.070352e-03	370.774090
## 7389	-608353.5	-3.408203	-3.409611	5.634737e-03	-138.723030
## 7446	1035234.1	5.798811	5.806182	1.452406e-02	-1120.057758
## 7447	952404.6	5.335700	5.341409	1.382142e-02	-1092.449832
## 7448	1038280.6	5.815841	5.823279	1.454223e-02	-1120.982715
## 7449	968159.3	5.423638	5.429641	1.369039e-02	-766.518862
## 7450	964740.3	5.404519	5.410457	1.365468e-02	-766.340667
## 7451	961307.1	5.385319	5.391193	1.361833e-02	-766.146035
## 7452	952441.3	5.335905	5.341615	1.382092e-02	-1092.550589
## 7453	1023271.3	5.731931	5.739045	1.443912e-02	-1117.035761
## 7454	1029333.1	5.765821	5.773064	1.448172e-02	-1118.706222
## 7455	959224.7	5.373836	5.379671	1.388911e-02	-1095.311207
## 7456	952399.2	5.335670	5.341379	1.382150e-02	-1092.435097
## 7457	1029246.0	5.765335	5.772576	1.448395e-02	-1118.461375
## 7458	961426.8	5.385986	5.391862	1.361481e-02	-766.434173
## 7459	899081.8	5.037505	5.042287	1.322467e-02	-1067.627434
## 7460	964740.3	5.404519	5.410457	1.365468e-02	-766.340667
## 7461	920890.2	5.159470	5.164618	1.348247e-02	-1078.332708
## 7462	910070.0	5.098958	5.103922	1.335673e-02	-1073.127547
## 7463	920892.6	5.159483	5.164631	1.348244e-02	-1078.339013
## 7507	-603938.1	-3.381962	-3.383336	3.848049e-03	-182.319765
## 7629	-692086.1	-3.902592	-3.904754	4.070742e-02	468.382868
## 7649	-510342.6	-2.856502	-2.857298	1.468082e-03	182.501773
## 7650	-510377.8	-2.856699	-2.857495	1.468729e-03	182.484232
## 7722	-474859.2	-2.679169	-2.679812	2.054092e-02	-103.555742
## 7791	-531886.7	-2.978494	-2.979406	2.993483e-03	-94.597473
## 7871	-877495.0	-4.916720	-4.921157	1.286868e-02	119.442882
## 8016	-376587.5	-2.107114	-2.107396	2.856372e-04	-25.104855
## 8119	-527855.6	-2.954295	-2.955183	1.342959e-03	5.146505
## 8154	-451079.8	-2.524017	-2.524545	4.918867e-04	63.669438
## 8206	-370926.2	-2.076394	-2.076662	9.402087e-04	-101.512776
## 8232	-606422.9	-3.395877	-3.397269	3.880810e-03	-183.465750
## 8262	-1568756.2	-8.845715	-8.872406	2.081840e-01	955.120423
## 8320	-674367.6	-3.782002	-3.783960	1.195919e-02	-264.953823

## 8377	-1405385.0	-8.119895	-8.140476	7.327127e-01	724.283140
## 8457	426016.1	2.383927	2.384361	5.610277e-04	95.864566
## 8458	-2920786.6	-16.461415	-16.637004	6.765886e-01	3796.452407
## 8535	-511789.8	-2.863813	-2.864615	7.220829e-04	130.322030
## 8541	-369327.1	-2.066550	-2.066813	3.159516e-04	88.429666
## 8698	449950.0	2.517491	2.518013	3.177203e-04	-150.865760
## 8710	1012753.8	5.668190	5.675064	4.987900e-03	-929.735935
## 8763	408646.4	2.286601	2.286977	4.184406e-04	-270.730788
## 8887	1298443.3	7.273841	7.288568	2.449938e-02	-1231.683746
## 8911	457792.1	2.562912	2.563467	1.649763e-03	-426.391118
## 8946	457792.1	2.562912	2.563467	1.649763e-03	-426.391118
## 9185	-373495.2	-2.089872	-2.090146	3.229039e-04	61.648049
## 9210	-463007.5	-2.591402	-2.591979	1.074748e-03	236.068368
## 9293	-707676.5	-3.960950	-3.963214	2.725228e-03	322.711166
## 9420	-410312.0	-2.302375	-2.302761	5.401441e-03	-180.065247
## 9453	-488257.9	-2.732249	-2.732936	7.599047e-04	-36.712598
## 9507	-709614.8	-4.001431	-4.003769	4.279091e-02	479.279679
## 9528	-1252215.2	-7.014352	-7.027536	2.156107e-02	62.836545
## 9546	-554251.6	-3.101530	-3.102570	9.647220e-04	-54.326094
## 9613	-359907.6	-2.013928	-2.014168	3.571013e-04	193.270785
## 9722	436139.1	2.440313	2.440784	3.760154e-04	-30.234616
## 10090	-385085.8	-2.155646	-2.155952	1.005372e-03	-354.560152
## 10112	-547985.4	-3.067136	-3.068139	1.630154e-03	-354.189842
## 10125	483784.6	2.709128	2.709796	2.476222e-03	-168.937657
## 10222	-582107.0	-3.258556	-3.259775	2.315836e-03	-306.663825
## 10318	744632.5	4.211850	4.214594	6.597917e-02	-504.393813
## 10371	-502103.5	-2.812200	-2.812956	3.127488e-03	-267.333293
## 10418	-489703.3	-2.742307	-2.743002	2.568729e-03	-81.770579
## 10478	-405204.8	-2.267376	-2.267741	4.361130e-04	-21.776184
## 10623	-489117.7	-2.737144	-2.737835	8.391060e-04	77.503287
## 10624	431896.6	2.418409	2.418865	1.849171e-03	72.443547
## 10723	446683.8	2.499735	2.500246	7.459614e-04	-184.314312
## 10741	-448618.7	-2.510263	-2.510780	5.004106e-04	65.671392
## 10787	695193.2	3.890503	3.892644	1.881398e-03	-437.955373
## 10958	-544576.9	-3.047423	-3.048406	9.643591e-04	133.963322
## 10995	-933904.5	-5.234834	-5.240217	1.816699e-02	1172.141150
## 11045	362782.1	2.038912	2.039163	6.457035e-03	-199.628701
## 11133	-398242.4	-2.229077	-2.229422	9.132407e-04	298.330645
## 11165	493640.5	2.763043	2.763757	1.398462e-03	-355.400330
## 11289	744669.4	4.167090	4.169744	1.746823e-03	-379.504891
## 11306	357965.4	2.006102	2.006338	2.393596e-03	180.878287
## 11347	-458160.6	-2.563919	-2.564475	7.483911e-04	-34.198679
## 11413	561395.9	3.142819	3.143904	2.365134e-03	-38.405316
## 11558	-2517135.9	-14.191602	-14.303506	5.275791e-01	4306.466497
## 11586	428815.7	2.399619	2.400063	5.885851e-04	-97.692790
## 11631	420438.6	2.357529	2.357947	4.344872e-03	56.657511
## 11692	378485.3	2.117869	2.118156	3.845477e-04	-77.991693
## 11728	451482.8	2.532185	2.532718	5.505636e-03	85.352625
## 11758	-521934.6	-2.923276	-2.924134	3.384532e-03	-280.775102
## 11772	1659988.2	9.298251	9.329305	3.706828e-02	-519.827409
## 11817	-433938.8	-2.428197	-2.428660	5.301529e-04	213.004855
## 11822	1136889.0	6.363445	6.373240	7.334186e-03	-125.763768
## 11854	-364561.3	-2.040049	-2.040300	4.208869e-04	-142.232363
## 11898	871390.3	4.957496	4.962047	1.402634e-01	-615.642985

##	11899	-454166.2	-2.590329	-2.590904	4.411654e-02	248.302198
##	11982	1026503.3	5.751410	5.758598	1.717886e-02	-1231.642562
##	12212	-990942.9	-5.553912	-5.560369	1.926099e-02	377.155978
##	12256	491733.6	2.752606	2.753310	1.604420e-03	-204.363296
##	12288	-1747780.2	-9.799926	-9.836346	7.370598e-02	372.511104
##	12293	364687.4	2.041015	2.041266	5.983284e-04	10.478992
##	12465	420853.9	2.356071	2.356488	1.358394e-03	-207.378054
##	12472	739446.9	4.138549	4.141147	2.666933e-03	-321.597604
##	12477	362402.2	2.027953	2.028199	4.065883e-04	-278.641304
##	12487	709561.5	3.972549	3.974834	4.131681e-03	-6.217227
##	12577	1063565.2	5.955501	5.963500	1.133092e-02	-19.484555
##	12582	1725985.1	9.666887	9.701827	3.670913e-02	-1497.845241
##	12602	-362582.3	-2.030879	-2.031126	1.708744e-03	-88.658033
##	12643	1794880.3	10.049246	10.088548	2.789619e-02	-445.676997
##	12686	-389844.4	-2.181414	-2.181733	3.963635e-04	-174.096235
##	12759	418006.0	2.338979	2.339385	4.425266e-04	-88.464023
##	12764	1029978.0	5.768818	5.776073	1.331264e-02	-823.198355
##	12782	-1622856.2	-9.098499	-9.127574	6.058006e-02	-160.301927
##	12816	678062.4	3.839378	3.841431	6.015476e-02	-448.899516
##	12843	-401001.9	-2.243877	-2.244230	4.419587e-04	202.719590
##	12850	-3660885.5	-20.637528	-20.987215	1.098003e+00	2673.852044
##	12854	412012.8	2.305822	2.306209	7.215939e-04	-70.677619
##		sq_ft_lot	bath_full_count	bedrooms	square_feet_total_living	
##	6	4.984341e-04	4.441388e+01	30.593250	-0.0927314954	
##	25	-1.082103e-03	-2.301891e+02	64.010313	-0.0489002423	
##	92	6.513498e-04	-8.963402e+00	13.024191	-0.1283737025	
##	115	-8.655087e-03	5.270002e+01	446.683658	-0.0907967739	
##	172	2.250230e-04	-6.320412e+01	17.422359	-0.0284743159	
##	178	-1.319177e-04	-2.069684e+02	20.701050	-0.1247334140	
##	222	5.764689e-05	3.739563e+01	24.624891	-0.0764516145	
##	239	-4.790476e-04	-1.266685e+01	-121.319961	0.1062120784	
##	246	2.682038e-04	9.129589e+01	28.374717	-0.0148682067	
##	261	1.021322e-02	7.244173e+01	88.695415	-0.1676733986	
##	287	6.368451e-04	8.475034e+01	64.351829	-0.1671908049	
##	295	-6.874315e-03	-6.511510e+03	162.554982	2.0106823051	
##	300	-4.808429e-03	5.319086e+02	67.578554	-0.4902244851	
##	341	-8.246852e-06	5.250440e+01	36.996410	-0.1039951470	
##	359	-2.468558e-03	8.762018e+01	65.149572	-0.1563056749	
##	385	-1.206144e-03	-2.198038e+02	-160.284001	0.4150592860	
##	396	2.011926e-03	7.130145e+01	-52.908731	0.1181642834	
##	459	3.055671e-04	1.184767e+02	-394.297720	0.0233816315	
##	475	-3.415307e-04	-1.092183e+02	10.369018	0.0676400769	
##	482	5.931349e-04	-5.901435e+02	-57.791184	-0.0234554137	
##	508	-3.098656e-03	-1.170081e+02	-14.422697	0.0579542381	
##	528	1.009455e-03	-6.894641e+00	28.287645	-0.2043141982	
##	576	-1.958976e-03	-8.115529e+01	12.385701	-0.0053960648	
##	656	1.326826e-04	-6.509556e+01	-40.723918	0.1255994087	
##	661	7.418016e-04	-8.878913e+01	-180.952684	0.3637802440	
##	662	-1.261025e-04	8.516582e+00	-59.780621	0.1258538653	
##	670	-1.245366e-03	-1.455652e+02	-75.209684	0.2942611708	
##	679	-4.628847e-04	2.773623e+02	-106.051575	-0.6737313374	
##	742	-4.674165e-04	4.696846e+01	32.284152	-0.0907956302	
##	782	-4.727209e-04	1.416018e+02	96.677999	-0.0271831978	
##	784	-2.024121e-03	2.084939e+02	51.854382	-0.1760413281	

## 802	-1.958408e-03	-8.020007e+01	14.825137	-0.0100830605
## 811	-1.867184e-03	-2.452107e+02	-147.132264	0.4810508149
## 814	-2.031338e-04	3.288257e+01	203.237146	-0.0597119407
## 853	1.544036e-03	5.335708e-02	-45.599547	0.0405097263
## 877	-2.646669e-03	-9.890080e+01	34.588528	-0.0376041038
## 916	-1.681159e-03	-4.255667e+02	174.702524	-0.3615134913
## 971	5.979388e-03	6.239576e+01	18.697570	-0.1013901783
## 998	4.215101e-04	-3.731844e+01	-13.530430	-0.0654058081
## 1009	1.135224e-05	-8.535459e+01	23.583152	-0.0333124947
## 1099	-1.647567e-03	1.904380e+01	8.646107	-0.0338757002
## 1119	7.269255e-04	-2.099895e+02	213.585868	-0.3169023737
## 1141	3.454471e-04	1.389844e+02	-36.487184	-0.0826731049
## 1142	4.502953e-04	-6.598499e+00	163.516699	-0.3030312048
## 1155	-1.009297e-02	-5.439394e+02	-227.299157	0.3227101556
## 1179	-6.603042e-05	-5.988833e+01	-36.946185	0.1170237645
## 1207	2.030684e-03	1.913873e+02	333.480412	-0.6565908440
## 1345	1.789095e-04	-8.007311e+01	-47.999719	0.0020906381
## 1368	-1.789704e-03	-7.443510e+01	22.694885	-0.0265212984
## 1380	3.214794e-04	1.866912e+01	74.008882	-0.0778845350
## 1387	5.232441e-04	7.432474e+01	-10.864387	-0.1102542199
## 1442	2.830778e-03	1.273401e+03	796.252268	-1.0299686677
## 1486	-6.307490e-04	1.952909e+01	22.802872	0.0382606415
## 1492	-9.560346e-04	-2.162351e+02	43.106081	-0.0178251815
## 1504	-4.407902e-03	1.129839e+02	151.961183	-0.4931760899
## 1543	-1.987460e-03	-7.703461e+01	9.599497	-0.0010517898
## 1550	-7.578776e-04	-5.063643e+01	96.449912	-0.1685938678
## 1633	1.060240e-04	-3.781056e-03	-62.612998	0.0193615069
## 1650	4.019796e-03	4.513490e+02	712.919645	-1.3855455852
## 1716	-6.992048e-04	7.577048e+01	56.598989	-0.1455169880
## 1745	-3.742951e-04	3.453524e+01	-86.348709	0.1951486516
## 1870	5.100289e-04	-5.349980e+01	-154.926319	0.3660314670
## 1904	5.566684e-04	-4.841961e+01	-17.442994	-0.0767606872
## 1959	1.491079e-04	1.335920e+02	84.330584	-0.1417537040
## 1962	2.473592e-03	7.491553e+01	-82.448731	0.1876961680
## 1963	-3.394746e-04	-1.117353e+02	-45.484243	0.0931955892
## 1964	1.851911e-03	2.611338e+02	250.345685	-0.3481520907
## 1976	-5.343726e-04	1.615939e+02	140.236879	0.0091866771
## 1977	-7.574051e-04	-3.293849e+01	38.358979	0.0971229005
## 1978	-5.419972e-04	1.858776e+02	25.863911	0.0338227395
## 1979	-7.785880e-04	-3.624360e+01	35.270467	0.1031153865
## 1980	-5.798935e-04	1.906207e+02	35.025660	0.0184362905
## 1981	-4.783088e-04	1.406083e+02	261.982198	-0.0292197234
## 1982	-5.307762e-04	1.698764e+02	149.381365	-0.0085629708
## 2020	1.428733e-03	-1.972239e+02	-46.817109	0.1823778451
## 2022	3.269523e-04	8.178319e+01	177.602679	-0.0837101416
## 2099	-1.923542e-05	4.468040e+01	-53.057386	0.1206764500
## 2115	-1.053249e-03	-6.937135e+01	28.458871	-0.0415320701
## 2137	-3.261997e-04	-1.155004e+02	-37.741818	0.0874454095
## 2157	-2.050047e-04	-4.587755e+00	19.680040	0.0239659268
## 2167	-1.719235e-03	1.913628e+02	67.013334	-0.2953744424
## 2243	1.660683e-03	-6.840000e+01	-111.654859	0.1603342025
## 2302	6.120148e-04	2.473717e+02	-591.568963	-0.0521814772
## 2360	-3.631724e-04	-1.222057e+02	-51.960635	0.1057996902
## 2361	1.205831e-02	2.699425e+03	647.090206	-2.8279572284

## 2379	-6.438762e-05	2.499334e+02	153.892022	-0.0715726289
## 2469	-3.354720e-04	-1.183301e+02	-44.156749	0.0951324462
## 2534	-1.236345e-03	-6.897745e+01	-39.445195	-0.0101539138
## 2684	-4.036854e-04	1.808088e+02	162.242384	-0.0437131747
## 2685	-7.232841e-04	1.715144e+02	9.758713	0.0596081917
## 2686	-1.181659e-03	-1.298470e+02	86.874040	0.1915957280
## 2687	-6.491787e-04	1.811224e+02	23.856166	0.0351212194
## 2688	-7.687632e-04	-3.081412e+01	38.280568	0.0925667080
## 2689	-1.108914e-03	-1.168816e+02	100.091109	0.1688547427
## 2690	-8.805534e-04	1.157563e+02	93.018392	0.0883164685
## 2699	-1.163940e-02	-1.379519e+02	-28.185426	0.1252354887
## 2708	1.174178e-03	9.150425e+01	68.154028	0.0627202628
## 2709	1.294663e-03	6.971983e+01	-67.159201	0.1557404394
## 2710	1.699776e-03	8.650068e+01	-54.125392	0.1307905819
## 2717	2.974518e-03	7.621093e+01	-92.085547	0.2089315482
## 2742	-6.469431e-04	-1.082940e+02	19.197988	-0.0156683608
## 2852	-8.189670e-04	-2.581566e+02	-170.060338	0.9677633724
## 2934	-6.988538e-04	7.573697e+01	56.568585	-0.1454537653
## 2937	-6.857939e-04	7.448378e+01	55.440111	-0.1430875327
## 3065	-2.553289e-04	7.124686e+01	-85.539943	0.1441019248
## 3097	2.546749e-03	7.614030e+01	-87.141943	0.1995009788
## 3102	-7.604445e-04	5.636170e+01	-55.782475	0.1363506988
## 3168	8.661280e-04	1.206531e+02	12.470859	-0.1114594317
## 3169	6.973904e-04	-9.003158e+01	13.307264	-0.0387952770
## 3175	2.359298e-04	-4.085144e+01	-46.040911	0.0105291282
## 3182	8.622839e-04	1.206153e+02	12.439510	-0.1113754450
## 3183	8.692636e-04	1.206840e+02	12.496431	-0.1115279388
## 3184	8.692636e-04	1.206840e+02	12.496431	-0.1115279388
## 3185	8.618329e-04	1.206108e+02	12.435832	-0.1113655922
## 3186	8.661280e-04	1.206531e+02	12.470859	-0.1114594317
## 3187	8.661280e-04	1.206531e+02	12.470859	-0.1114594317
## 3188	6.684045e-04	-9.026723e+01	13.070452	-0.0381791969
## 3189	2.387350e-04	-4.083038e+01	-46.022499	0.0104714424
## 3191	2.398703e-04	-4.082186e+01	-46.015046	0.0104480958
## 3198	8.544890e-04	1.205385e+02	12.375941	-0.1112051422
## 3199	8.551332e-04	1.205449e+02	12.381194	-0.1112192159
## 3200	8.692636e-04	1.206840e+02	12.496431	-0.1115279388
## 3201	8.692636e-04	1.206840e+02	12.496431	-0.1115279388
## 3202	8.692636e-04	1.206840e+02	12.496431	-0.1115279388
## 3260	3.067731e-04	5.006169e+01	34.227783	0.0312722125
## 3357	3.170160e-04	-1.560932e+02	-82.199541	-0.0086186327
## 3424	4.882694e-04	-9.506975e+01	48.068371	-0.0758467582
## 3464	2.361431e-04	-4.062778e+01	-45.221871	0.0107787467
## 3468	2.331461e-04	-4.065023e+01	-45.241543	0.0108403273
## 3474	2.263103e-04	-4.070143e+01	-45.286408	0.0109807830
## 3478	8.559508e-04	1.191856e+02	13.229955	-0.1095214805
## 3479	8.559508e-04	1.191856e+02	13.229955	-0.1095214805
## 3480	8.559508e-04	1.191856e+02	13.229955	-0.1095214805
## 3481	8.559508e-04	1.191856e+02	13.229955	-0.1095214805
## 3482	8.559508e-04	1.191856e+02	13.229955	-0.1095214805
## 3483	8.559295e-04	1.191854e+02	13.229781	-0.1095210156
## 3484	6.889528e-04	-8.959413e+01	14.089942	-0.0375099391
## 3494	2.324105e-04	-4.065574e+01	-45.246371	0.0108554427
## 3495	8.559295e-04	1.191854e+02	13.229781	-0.1095210156

## 3496	8.559295e-04	1.191854e+02	13.229781	-0.1095210156
## 3497	8.559295e-04	1.191854e+02	13.229781	-0.1095210156
## 3523	-2.765770e-04	9.964624e+01	-13.109246	0.0560188968
## 3710	4.074866e-05	1.968982e+01	10.101287	-0.0447432852
## 3810	7.691175e-05	1.042798e+01	-62.825581	0.0041809921
## 3837	-7.467249e-04	5.591802e+01	39.490610	-0.1080568318
## 3918	6.080998e-04	-1.724393e+02	174.619318	-0.2628597893
## 3919	3.803907e-04	-4.921756e+00	134.218122	-0.2523394352
## 4055	-7.679568e-04	-2.228679e+02	-21.663944	0.1900851431
## 4056	9.957185e-04	1.535623e+02	222.912870	-0.1966899831
## 4200	4.935560e-04	5.688563e+01	41.693810	-0.1118667873
## 4285	3.113731e-04	-8.589942e+01	-47.928154	-0.0142298724
## 4435	5.262825e-04	5.478629e+01	39.195943	-0.1118437184
## 4571	-5.455565e-04	9.405780e+01	52.007844	-0.0697155361
## 4648	3.339694e-02	-2.441180e+02	-397.881700	0.5127573043
## 4649	4.847042e-02	1.068631e+02	431.421420	-0.7725989987
## 4671	-4.116436e-03	-3.384985e+02	119.811918	-0.2411554641
## 4696	-9.446711e-04	3.352206e+01	-94.304923	0.2169281392
## 4821	6.480064e-04	9.086270e+01	187.928000	-0.0982365535
## 4834	2.739372e-04	7.349640e+01	168.527528	-0.0721343277
## 4840	-1.032740e-02	-5.565992e+02	-232.325143	0.3304170877
## 4934	-4.673720e-04	-4.960193e+01	-21.720555	0.1046494671
## 4955	-5.864234e-05	1.100743e+02	86.850051	-0.2030376111
## 4956	-5.864234e-05	1.100743e+02	86.850051	-0.2030376111
## 5024	-4.225549e-04	3.569413e+01	124.132371	-0.0148050866
## 5083	-2.439524e-02	-4.625457e+02	-31.396674	0.2952496292
## 5363	-2.401619e-03	4.101673e+01	174.818572	0.0172494105
## 5491	-1.919927e-04	1.270786e+00	20.683706	0.0111915584
## 5494	-2.100911e-04	-3.402755e-01	19.180619	0.0141529213
## 5495	-2.044634e-04	1.158291e+00	20.570524	0.0114503639
## 5496	-1.934284e-04	1.257835e+00	20.670677	0.0112213539
## 5498	-3.199071e-04	-1.557132e+01	4.207977	0.0412029160
## 5549	-4.049730e-04	1.231931e+02	74.684408	-0.1175645337
## 5559	1.260357e-03	2.862809e+01	-48.487629	0.0979843726
## 5648	-4.783269e-04	4.798175e+01	33.081615	-0.0927331861
## 5935	-1.028586e-03	-4.445124e+01	247.541694	-0.2803914866
## 6230	-9.505012e-04	-3.923569e+01	48.539679	0.1156215794
## 6231	-1.089385e-03	-5.960629e+01	29.399790	0.1525406377
## 6232	-9.057966e-04	1.958117e+02	10.453400	0.0852684035
## 6233	-8.331670e-04	-2.361444e+01	62.726981	0.0869191919
## 6234	-7.333730e-04	-4.105884e+01	204.555698	0.0357512159
## 6235	-7.176129e-04	-3.915855e+01	205.674413	0.0325987770
## 6236	-7.310679e-04	-4.103876e+01	204.576962	0.0357029094
## 6237	-7.187477e-04	-3.916845e+01	205.663929	0.0326225739
## 6238	-7.752183e-04	-1.582204e+01	69.552320	0.0724433880
## 6239	-1.091439e-03	-5.962405e+01	29.382763	0.1525826075
## 6369	2.401919e-04	-6.799420e+01	18.953271	-0.0303066031
## 6422	5.268231e-04	2.173300e+01	91.516126	-0.1806465222
## 6429	-1.790288e-03	-8.147909e+01	131.835066	0.2380366628
## 6430	-9.081331e-04	2.148861e+01	198.724216	0.0353476168
## 6431	-1.205757e-03	-5.938474e+00	191.449838	0.0944174358
## 6432	-1.372248e-03	-3.805873e+01	169.133244	0.1565423808
## 6433	-1.403567e-03	-6.830140e+01	407.336071	0.0753602812
## 6434	-1.399266e-03	-6.826362e+01	407.374331	0.0752700689

## 6435	-1.164588e-03	3.355212e+02	364.825921	0.0159394143
## 6436	-9.830215e-04	-1.038263e+01	189.676146	0.1023870368
## 6437	-1.032426e-03	1.362989e+01	198.993363	0.0534815477
## 6438	-1.178581e-03	2.296400e+01	14.382651	0.1304672136
## 6439	-1.679285e-03	-6.132771e+01	149.613216	0.2008800617
## 6440	-1.479377e-03	3.554100e+02	112.672732	0.1066560440
## 6441	-1.114833e-03	3.660674e+02	169.446329	0.0035247254
## 6442	-1.640984e-03	-5.393677e+01	155.903900	0.1871443609
## 6443	-6.277051e-04	3.386256e+02	374.732143	-0.1279518030
## 6444	-9.245674e-04	3.373891e+02	365.353697	-0.0751490968
## 6445	-5.812225e-04	3.101296e+02	176.024166	-0.0686403216
## 6446	-1.012087e-03	3.444906e+02	150.653620	-0.0021231823
## 6447	-1.104470e-03	3.247289e+02	346.546931	-0.0234300327
## 6448	-9.090923e-04	1.351952e+01	179.826149	0.0472675698
## 6449	-1.597681e-03	-1.207157e+02	340.672682	0.1604963168
## 6450	-1.953533e-03	-1.717384e+02	303.718547	0.2460322490
## 6451	-6.071075e-04	3.114118e+02	175.852603	-0.0673876549
## 6452	-1.036936e-03	3.446712e+02	148.621061	0.0018726423
## 6453	-1.211410e-03	3.131955e+02	331.609042	0.0112433318
## 6454	-9.730557e-04	3.344254e+02	360.365021	-0.0597312979
## 6455	-4.994287e-04	3.365798e+02	374.348355	-0.1380433239
## 6456	-9.650208e-04	4.889171e+00	176.754213	0.0653830406
## 6457	-1.400567e-03	-8.009010e+01	364.495248	0.0941463805
## 6512	-1.012171e-03	6.240059e+01	-92.674227	0.2291181479
## 6527	7.978083e-04	2.542205e+02	-13.631577	-0.2049042392
## 6545	1.283619e-05	-7.840604e+01	21.328173	-0.0311088376
## 6587	8.371732e-04	2.197371e+02	183.479270	-0.3991615066
## 6739	-4.287773e-04	-2.355956e+02	95.632366	-0.0060104856
## 6740	-1.268403e-03	5.611468e+01	40.011794	-0.1015872581
## 6746	-1.855063e-04	-2.902629e+02	13.749327	-0.0441304573
## 6767	1.055358e-02	1.287927e+02	33.139538	-0.1097513884
## 6796	2.716239e-04	-7.818484e+01	22.303890	-0.0340597270
## 6821	4.860242e-04	2.000155e+02	-50.589872	-0.1170566518
## 6915	-1.855063e-04	-2.902629e+02	13.749327	-0.0441304573
## 6924	5.555280e-04	2.182356e+01	96.934541	-0.1909139024
## 6931	4.370266e-04	3.636023e+01	23.948332	-0.0779259958
## 6938	-8.986007e-04	-6.993112e+01	-15.880091	0.1548570438
## 6939	-9.257761e-04	8.149735e+01	-56.955322	0.1532866862
## 6940	-6.344948e-04	-2.751259e+01	25.483274	0.0794091879
## 6941	-6.020566e-04	-2.787051e+01	25.152128	0.0798792886
## 6942	-6.659411e-04	9.463540e+01	72.473207	0.0675132719
## 6943	-4.818279e-04	2.738515e+02	70.260260	-0.0001727627
## 6944	-1.006020e-03	-1.204052e+02	47.871342	0.1815579439
## 6945	-8.986007e-04	-6.993112e+01	-15.880091	0.1548570438
## 6946	-6.348031e-04	-2.815438e+01	24.876846	0.0805472826
## 6947	-5.815125e-04	-2.074628e+01	31.833614	0.0671182650
## 6948	-5.394707e-04	-1.729411e+01	35.038121	0.0607428549
## 7039	1.002888e-03	3.752329e+01	-50.240903	0.1057713721
## 7066	1.090960e-04	-7.974098e+01	-50.508684	0.0177090519
## 7147	8.383392e-04	-3.810676e+01	3.632689	-0.1575594059
## 7167	-1.477465e-03	-1.792652e+02	-65.745712	0.3720445765
## 7210	3.564179e-03	1.510184e+02	-17.697088	0.0701402619
## 7211	2.854277e-03	1.944104e+02	170.348674	-0.0863439559
## 7388	2.726753e-04	2.444361e+00	-44.958285	-0.0996568927

## 7389	4.488422e-04	5.054121e+01	261.526750	-0.3713411708
## 7446	-7.331484e-04	1.205119e+01	128.220791	0.0328473790
## 7447	-6.224039e-04	2.073033e+01	131.383628	0.0142321931
## 7448	-7.255615e-04	1.178580e+01	128.139497	0.0333698761
## 7449	-8.488721e-04	2.148229e+01	-16.587191	0.0919123877
## 7450	-8.443526e-04	2.177487e+01	-16.003987	0.0909837471
## 7451	-8.394096e-04	2.206807e+01	-15.420295	0.0900496881
## 7452	-6.161593e-04	2.078686e+01	131.439487	0.0141007015
## 7453	-7.068784e-04	1.359671e+01	129.005664	0.0296076866
## 7454	-7.128750e-04	1.289391e+01	128.686271	0.0310697676
## 7455	-6.243616e-04	2.019456e+01	131.323600	0.0154223991
## 7456	-6.233171e-04	2.072207e+01	131.375460	0.0142514222
## 7457	-7.288751e-04	1.275004e+01	128.545250	0.0314054421
## 7458	-8.189066e-04	2.225401e+01	-15.255089	0.0896267255
## 7459	-5.748493e-04	2.462303e+01	131.384268	0.0052152485
## 7460	-8.443526e-04	2.177487e+01	-16.003987	0.0909837471
## 7461	-5.985718e-04	2.311494e+01	131.503550	0.0087908959
## 7462	-5.866203e-04	2.388534e+01	131.472191	0.0069790464
## 7463	-5.981899e-04	2.311841e+01	131.506987	0.0087828433
## 7507	-2.269527e-03	2.331128e+02	58.647617	-0.1963652090
## 7629	-1.397224e-03	7.900675e+02	193.773524	-0.9761118195
## 7649	3.422174e-04	-2.023309e+02	40.253434	-0.0230448469
## 7650	3.454481e-04	-2.023163e+02	40.282227	-0.0231139948
## 7722	2.632782e-03	4.365650e+02	372.370942	-0.7907589211
## 7791	-1.941561e-03	-4.118092e+01	153.463945	-0.1621978812
## 7871	-5.211683e-03	-7.473978e+00	172.815103	-0.2921216185
## 8016	3.410652e-04	3.284855e+01	21.150385	-0.0692568833
## 8119	4.487295e-04	1.835250e+02	-46.898340	-0.1078852731
## 8154	-2.303642e-04	-8.529317e+01	17.343671	-0.0209685265
## 8206	8.196454e-05	1.513588e+02	41.791523	-0.1435964030
## 8232	-2.279012e-03	2.340614e+02	58.912472	-0.1971461383
## 8262	-3.206300e-03	1.787858e+03	445.527855	-2.2051154125
## 8320	-6.081596e-03	9.654193e+01	175.995979	-0.2063156495
## 8377	-5.816638e-02	1.947151e+02	-97.492112	0.0630395415
## 8457	-3.337739e-04	-1.100249e+02	-44.910961	0.0916886492
## 8458	1.808212e-03	2.566998e+02	251.912810	-0.3400190428
## 8535	4.634695e-04	5.951182e+01	-36.447106	-0.0792623921
## 8541	1.062603e-04	-1.098505e-02	-62.795139	0.0194410377
## 8698	-2.415126e-04	-1.428630e+01	11.120494	0.0415582687
## 8710	-1.030225e-03	7.915554e+01	57.110030	0.1806785809
## 8763	-2.041959e-04	-1.637619e+01	69.648908	0.0110031222
## 8887	-1.764615e-03	5.993853e+02	-275.547484	0.3881244876
## 8911	1.640616e-04	1.067489e+02	-21.426149	0.1146553891
## 8946	1.640616e-04	1.067489e+02	-21.426149	0.1146553891
## 9185	2.316435e-04	-6.528491e+01	18.083893	-0.0292756456
## 9210	6.482211e-04	-8.912702e+00	12.945652	-0.1277559794
## 9293	1.019346e-03	-6.994437e+00	28.641324	-0.2063231538
## 9420	-4.126903e-03	2.276324e+02	6.740795	-0.0937703771
## 9453	-4.924307e-04	5.528102e+01	39.017349	-0.1066464545
## 9507	-1.432967e-03	8.100505e+02	198.738359	-1.0007664564
## 9528	-3.550103e-03	7.156140e+01	324.944689	-0.5806000715
## 9546	-7.293562e-04	5.473960e+01	38.482842	-0.1058164020
## 9613	2.713627e-04	-4.636215e+01	-24.679436	-0.0290622764
## 9722	-2.349763e-04	4.208912e+00	-38.130388	0.0439789765

## 10090	1.646463e-05	1.148449e+02	81.660433	-0.0342525128
## 10112	-5.155898e-06	1.861029e+01	109.021033	0.0098960654
## 10125	9.055111e-04	-1.745537e+01	-104.596925	0.2117692000
## 10222	-2.787377e-04	2.739312e+01	116.750016	-0.0026172887
## 10318	1.776210e-02	2.154227e+02	59.406635	-0.1808486693
## 10371	-3.962415e-04	3.242269e+02	50.889393	-0.2214957615
## 10418	-2.571506e-03	-8.058650e+01	104.327175	-0.0702565039
## 10478	-4.281451e-04	3.862228e+01	25.415060	-0.0758531704
## 10623	-8.241769e-04	-7.201952e+01	35.966658	-0.0555271289
## 10624	1.586195e-03	-6.523828e+01	-106.723539	0.1529109909
## 10723	-5.765581e-04	4.258476e+01	-43.029836	0.1010466563
## 10741	1.066923e-04	-7.250602e+01	27.568427	-0.0443875198
## 10787	-6.453607e-04	-1.002183e+02	54.360035	0.1467010755
## 10958	-1.156910e-03	2.908542e+01	-67.372512	-0.0149193595
## 10995	-1.889366e-03	-2.475397e+02	98.671276	-0.4281070362
## 11045	5.522030e-03	1.043253e+02	26.642960	-0.0719158669
## 11133	9.258111e-05	-1.704251e+02	-42.374898	0.0362727927
## 11165	-2.622909e-04	2.010027e+02	-19.637847	0.0160702724
## 11289	-5.285758e-04	-2.341784e+01	29.361271	0.0716125131
## 11306	2.664088e-03	-1.672407e+02	-26.163584	0.0632755074
## 11347	3.104100e-04	6.715248e+01	49.507078	-0.1312205523
## 11413	2.200710e-03	-1.018560e+02	-9.214458	0.0333538027
## 11558	1.621270e-03	2.705398e+02	-147.318971	-0.1795026319
## 11586	-2.357257e-04	-1.001460e+02	33.925015	0.0399570381
## 11631	3.829560e-03	-4.864415e+01	-90.813513	0.1102594619
## 11692	3.635048e-04	-3.872046e+01	-17.892652	0.0775783748
## 11728	4.675533e-03	-4.292893e+01	-41.239739	-0.0215165042
## 11758	-4.129602e-04	3.369563e+02	53.070879	-0.2300476027
## 11772	-2.7776872e-03	-5.271641e+02	-370.366358	0.9944311429
## 11817	1.833270e-04	-8.477290e+01	-52.950804	0.0167321732
## 11822	-1.473636e-03	-1.283275e+02	-215.419145	0.3645003259
## 11854	-1.834422e-04	1.639828e+01	22.420750	0.0301541864
## 11898	2.622226e-02	1.834979e+02	222.123655	-0.4337172781
## 11899	-1.377794e-02	-6.823971e+01	-19.880134	0.2235815721
## 11982	1.441877e-03	3.872008e+02	-142.866545	0.3592411377
## 12212	-3.802057e-03	4.197095e+01	-3.259807	0.0910634610
## 12256	2.460613e-03	1.332725e+01	39.468158	-0.0199514440
## 12288	-1.917464e-03	6.266638e+01	227.961634	0.0081128396
## 12293	-2.494632e-04	-1.286744e+02	-16.339718	0.1086334371
## 12465	2.121586e-03	8.274331e+01	-1.965813	0.0062071323
## 12472	-6.711277e-05	1.776169e+02	-70.983469	0.0386835015
## 12477	-3.043715e-04	4.442674e+01	29.847684	0.0350130793
## 12487	-1.280741e-03	-3.057887e+02	-76.992169	0.3133112488
## 12577	4.080691e-03	-1.400375e+02	-228.767757	0.3432543911
## 12582	-3.088578e-03	-1.884449e+02	-188.381317	0.8808779230
## 12602	-1.063711e-03	1.671606e+02	56.808561	-0.1675852903
## 12643	3.412732e-05	-2.561550e+02	-366.768880	0.6607378232
## 12686	2.719186e-04	1.940864e+01	70.642619	-0.0763898018
## 12759	-1.021219e-04	-4.669107e+01	-22.787636	0.0954581984
## 12764	3.523403e-03	-5.483275e+01	-70.355820	0.3929609973
## 12782	-2.111330e-03	4.580822e+02	211.842147	-0.1101322648
## 12816	1.697475e-02	1.967051e+02	53.124052	-0.1698127913
## 12843	1.208804e-04	-7.898420e+01	-49.958204	0.0167569988
## 12850	-6.673133e-03	1.067147e+03	720.074143	-0.6581136304

```

## 12854 1.349831e-04 -6.641015e+01 -41.478314          0.1281505644
##      price_per_sq_ft       dffit      leverage covariance_ratios
## 6      1.839133e-01 -0.05641929 0.0004428224          0.9975606
## 25     2.491124e-01 -0.12426783 0.0012684339          0.9960724
## 92     3.342543e-02 -0.08072263 0.0009594181          0.9982626
## 115    -6.795734e+00 -0.95005993 0.0087032525          0.9621597
## 172     1.129254e-01 -0.04249512 0.0004402214          0.9989944
## 178     1.823246e-01 -0.14745364 0.0012510952          0.9936448
## 222     1.329143e-01 -0.04612607 0.0004049720          0.9984228
## 239     1.768460e-01  0.06706895 0.0007982764          0.9986393
## 246    -2.925227e+00 -0.36377159 0.0039584527          0.9889765
## 261     6.186135e-02  0.35717485 0.0181925868          1.0157374
## 287     2.284713e-01 -0.08909744 0.0006843873          0.9957538
## 295     1.068527e+00 -2.30187860 0.1059352343          1.0959399
## 300     2.691274e-01 -0.35076646 0.0038262668          0.9894274
## 341     1.546545e-01 -0.05961310 0.0005146572          0.9977643
## 359     2.696775e-01 -0.13917455 0.0014283287          0.9955900
## 385     4.023323e-01  0.19133991 0.0020007660          0.9939720
## 396     2.936207e-01  0.12622434 0.0011762790          0.9953447
## 459    -1.679325e-02 -0.20504228 0.0034121361          0.9981590
## 475     2.037259e-01  0.05164722 0.0005591511          0.9988022
## 482     1.176474e-01 -0.26849242 0.0034215920          0.9941217
## 508     2.574848e-01 -0.11952675 0.0024483888          1.0002024
## 528     1.293767e-01 -0.12661343 0.0010404881          0.9943459
## 576     1.653844e-01 -0.08542439 0.0013478444          0.9992932
## 656     1.341909e-01  0.06446709 0.0008120534          0.9988938
## 661     2.157934e-01  0.18559193 0.0035827826          0.9995875
## 662     1.106157e-01  0.06858038 0.0011313979          0.9996614
## 670     7.396911e-01  0.16011254 0.0008975727          0.9881345
## 679     3.146927e-02 -0.42356910 0.0031001947          0.9769801
## 742     1.280388e-01 -0.05803755 0.0005900004          0.9983962
## 782    -4.405016e-01 -0.10622605 0.0014117698          0.9981578
## 784     1.774240e-01 -0.13534939 0.0020016368          0.9982112
## 802     1.661330e-01 -0.08645230 0.0013292915          0.9991775
## 811     1.034979e+00  0.24621253 0.0013187069          0.9805923
## 814    -7.387541e-01 -0.14620884 0.0021151772          0.9978821
## 853     1.704492e-01  0.07141894 0.0008527985          0.9985329
## 877     2.809650e-01 -0.12328326 0.0013779829          0.9967134
## 916     2.226254e-01 -0.33746870 0.0029652751          0.9856975
## 971     7.069948e-02  0.20985703 0.0107654902          1.0094467
## 998     6.093366e-02 -0.06008474 0.0006364963          0.9984600
## 1009    2.053939e-01 -0.05815666 0.0004674859          0.9975637
## 1099    1.340410e-01 -0.07061741 0.0011852227          0.9996919
## 1119    2.885893e-01 -0.22084630 0.0018078389          0.9897754
## 1141    9.476132e-02 -0.066662890 0.0008921746          0.9990402
## 1142    2.522641e-01 -0.16620224 0.0013022640          0.9919254
## 1155    4.255544e-01 -0.40330362 0.0095568270          1.0022109
## 1179    1.278393e-01  0.05851214 0.0007348446          0.9990301
## 1207   -1.591917e-02 -0.30421985 0.0044190989          0.9951854
## 1345    1.525407e-01 -0.05804239 0.0005186800          0.9979590
## 1368    1.599108e-01 -0.08461598 0.0011920846          0.9988614
## 1380    2.165168e-01 -0.05200100 0.0005010792          0.9984526
## 1387    5.457781e-02 -0.06613881 0.0007558099          0.9985257
## 1442   -2.447722e+01 -3.07967409 0.0190081592          0.8150460

```

## 1486	-4.046897e-01	-0.07221832	0.0008580394	0.9984929
## 1492	2.181279e-01	-0.10629429	0.0012070006	0.9973167
## 1504	1.985678e-01	-0.33823480	0.0032051120	0.9871801
## 1543	1.472579e-01	-0.08378312	0.0015071983	0.9998053
## 1550	2.411993e-01	-0.11936207	0.0009594344	0.9945228
## 1633	1.801333e-01	-0.04336958	0.0004429138	0.9989297
## 1650	1.742674e-01	-0.64063910	0.0056715017	0.9730413
## 1716	3.290287e-01	-0.09792546	0.0006637515	0.9944129
## 1745	3.194658e-01	0.11426855	0.0009664418	0.9951502
## 1870	2.027263e-01	0.18942614	0.0065341235	1.0044870
## 1904	1.146590e-01	-0.07458812	0.0006416649	0.9970709
## 1959	1.223320e-01	-0.07332179	0.0012332661	0.9996694
## 1962	4.791670e-01	0.17321344	0.0012971331	0.9910353
## 1963	2.492722e-01	0.05916344	0.0005971333	0.9983322
## 1964	-1.695064e+01	-2.07710884	0.0150465986	0.8916039
## 1976	9.808583e-01	0.16193140	0.0009736963	0.9889610
## 1977	1.117598e+00	0.14599792	0.0008220054	0.9892688
## 1978	1.031581e+00	0.15475230	0.0009276993	0.9894282
## 1979	1.108661e+00	0.14577255	0.0008078502	0.9890829
## 1980	1.061357e+00	0.15668624	0.0009940877	0.9900096
## 1981	9.556420e-01	0.18775935	0.0013164159	0.9893737
## 1982	1.014470e+00	0.16466852	0.0010331482	0.9893355
## 2020	1.590739e-01	0.11875187	0.0019668075	0.9990975
## 2022	-2.511608e+00	-0.33020857	0.0037745716	0.9908762
## 2099	2.104148e-01	0.07932223	0.0007567772	0.9973517
## 2115	1.522464e-01	-0.06840196	0.0007598105	0.9983574
## 2137	3.993640e-01	0.06970130	0.0006518040	0.9976466
## 2157	2.792530e-01	0.04212470	0.0003073830	0.9980835
## 2167	3.887827e-03	-0.17347890	0.0030063546	0.9988228
## 2243	1.061412e-01	0.11043533	0.0018960037	0.9993694
## 2302	-1.108067e-01	-0.32920061	0.0047519609	0.9946620
## 2360	2.605396e-01	0.06452090	0.0006373196	0.9980607
## 2361	-7.862979e+01	-10.05006782	0.0550943893	0.4959893
## 2379	-1.314917e+00	-0.21889783	0.0020808346	0.9918694
## 2469	3.293635e-01	0.06613479	0.0006204770	0.9978033
## 2534	1.272276e-01	-0.07317926	0.0008188152	0.9982387
## 2684	1.035566e+00	0.16477462	0.0011620785	0.9907921
## 2685	9.495092e-01	0.14836960	0.0008506409	0.9893215
## 2686	8.329788e-01	0.15669122	0.0008737432	0.9883228
## 2687	9.915570e-01	0.15022125	0.0009120377	0.9899061
## 2688	1.079639e+00	0.14126995	0.0008065545	0.9897999
## 2689	8.695180e-01	0.15482762	0.0008511751	0.9882712
## 2690	8.127611e-01	0.15096490	0.0008539661	0.9889525
## 2699	2.906408e-01	-0.41165876	0.0240635291	1.0218535
## 2708	4.753548e-01	0.11936743	0.0008213330	0.9932282
## 2709	3.816290e-01	0.12835917	0.0009689428	0.9935352
## 2710	4.068094e-01	0.13173785	0.0009763790	0.9931863
## 2717	5.414298e-01	0.19689899	0.0014405772	0.9894374
## 2742	2.963837e-01	-0.07213378	0.0005483802	0.9965974
## 2852	8.355465e-01	0.50208990	0.0076538144	0.9929423
## 2934	3.287083e-01	-0.09787189	0.0006636449	0.9944190
## 2937	3.170037e-01	-0.09588730	0.0006597971	0.9946462
## 3065	1.110017e-01	0.09068246	0.0020022182	1.0005586
## 3097	5.185869e-01	0.18159516	0.0013109316	0.9901161

## 3102	3.002499e-01	0.09186691	0.0007557100	0.9960255
## 3168	-3.915491e+00	-0.47133164	0.0104908044	1.0012437
## 3169	-4.015392e+00	-0.48492423	0.0104502791	1.0005906
## 3175	-1.737913e+00	-0.20890849	0.0079950206	1.0059853
## 3182	-3.915315e+00	-0.47130792	0.0104904280	1.0012440
## 3183	-3.915635e+00	-0.47135102	0.0104911126	1.0012435
## 3184	-3.915635e+00	-0.47135102	0.0104911126	1.0012435
## 3185	-3.915295e+00	-0.47130514	0.0104903839	1.0012440
## 3186	-3.915491e+00	-0.47133164	0.0104908044	1.0012437
## 3187	-3.915491e+00	-0.47133164	0.0104908044	1.0012437
## 3188	-4.014099e+00	-0.48476372	0.0104481639	1.0005932
## 3189	-1.738107e+00	-0.20893120	0.0079953127	1.0059851
## 3191	-1.738185e+00	-0.20894041	0.0079954319	1.0059850
## 3198	-3.914959e+00	-0.47125992	0.0104896697	1.0012445
## 3199	-3.914988e+00	-0.47126388	0.0104897321	1.0012445
## 3200	-3.915635e+00	-0.47135102	0.0104911126	1.0012435
## 3201	-3.915635e+00	-0.47135102	0.0104911126	1.0012435
## 3202	-3.915635e+00	-0.47135102	0.0104911126	1.0012435
## 3260	1.581152e-01	0.05439835	0.0006102185	0.9988166
## 3357	4.760166e-02	-0.09728552	0.0012815635	0.9983097
## 3424	3.096371e-01	-0.08437392	0.0005694681	0.9952204
## 3464	-1.707010e+00	-0.20525258	0.0078535773	1.0058855
## 3468	-1.706804e+00	-0.20522829	0.0078532633	1.0058856
## 3474	-1.706334e+00	-0.20517309	0.0078525617	1.0058860
## 3478	-3.844172e+00	-0.46288309	0.0103073122	1.0012358
## 3479	-3.844172e+00	-0.46288309	0.0103073122	1.0012358
## 3480	-3.844172e+00	-0.46288309	0.0103073122	1.0012358
## 3481	-3.844172e+00	-0.46288309	0.0103073122	1.0012358
## 3482	-3.844172e+00	-0.46288309	0.0103073122	1.0012358
## 3483	-3.844171e+00	-0.46288296	0.0103073101	1.0012358
## 3484	-3.943148e+00	-0.47636614	0.0102676676	1.0005890
## 3494	-1.706754e+00	-0.20522234	0.0078531868	1.0058857
## 3495	-3.844171e+00	-0.46288296	0.0103073101	1.0012358
## 3496	-3.844171e+00	-0.46288296	0.0103073101	1.0012358
## 3497	-3.844171e+00	-0.46288296	0.0103073101	1.0012358
## 3523	3.542514e-01	0.07695926	0.0005433004	0.9959363
## 3710	1.580089e-01	-0.03671250	0.0002833412	0.9985324
## 3810	1.936113e-01	-0.04801088	0.0004126050	0.9982755
## 3837	2.444653e-01	-0.07807746	0.0006051683	0.9963826
## 3918	1.783023e-01	-0.18101832	0.0017888793	0.9937505
## 3919	1.590014e-01	-0.136666904	0.0012845777	0.9949920
## 4055	3.971331e-01	0.10982215	0.0009516552	0.9955234
## 4056	-6.200963e+00	-0.76873189	0.0084008083	0.9767168
## 4200	5.907629e-02	-0.05519146	0.0007556484	0.9993434
## 4285	2.004674e-01	-0.07054291	0.0005410463	0.9967251
## 4435	1.927378e-01	-0.06438728	0.0005051028	0.9971491
## 4571	2.169323e-01	-0.05830204	0.0008036702	0.9992991
## 4648	2.410589e+00	1.33465744	0.0105827067	0.9360284
## 4649	4.422885e+00	1.79560107	0.0478428048	1.0198174
## 4671	1.168879e-01	-0.29663025	0.0038992759	0.9939124
## 4696	3.691084e-01	0.12521950	0.0010215244	0.9943536
## 4821	-2.849318e+00	-0.37086839	0.0041488980	0.9892960
## 4834	-2.132465e+00	-0.28512672	0.0033004651	0.9923566
## 4840	4.446241e-01	-0.41276640	0.0095632227	1.0018492

## 4934	2.197541e-01	0.05800144	0.0004771724	0.9976592
## 4955	2.122404e-02	-0.09735600	0.0018725049	0.9999838
## 4956	2.122404e-02	-0.09735600	0.0018725049	0.9999838
## 5024	-8.925119e-01	-0.14196551	0.0016619604	0.9964894
## 5083	7.107631e-01	-0.86992515	0.0308350497	1.0209137
## 5363	-2.497811e+00	-0.35493119	0.0030996188	0.9848109
## 5491	2.210733e-01	0.03388291	0.0002828256	0.9988568
## 5494	2.170699e-01	0.03379250	0.0002766880	0.9988190
## 5495	2.211159e-01	0.03395324	0.0002843090	0.9988603
## 5496	2.210783e-01	0.03389074	0.0002829915	0.9988572
## 5498	1.754327e-01	0.03451442	0.0002753927	0.9987253
## 5549	1.601295e-01	-0.07099159	0.0010891631	0.9994001
## 5559	1.089988e-01	0.08379572	0.0013805042	0.9994785
## 5648	1.340995e-01	-0.05943332	0.0005919914	0.9982782
## 5935	3.480230e-01	-0.17948308	0.0016324082	0.9929388
## 6230	1.461690e+00	0.18702879	0.0010369281	0.9858998
## 6231	1.405364e+00	0.18562166	0.0009496143	0.9846445
## 6232	1.292829e+00	0.19181130	0.0010111339	0.9846590
## 6233	1.500205e+00	0.18858795	0.0011394930	0.9871597
## 6234	1.490007e+00	0.20478791	0.0012712083	0.9864755
## 6235	1.494633e+00	0.20505942	0.0012848828	0.9866105
## 6236	1.489996e+00	0.20478041	0.0012710841	0.9864750
## 6237	1.494639e+00	0.20506300	0.0012849433	0.9866108
## 6238	1.516724e+00	0.18937483	0.0012075564	0.9879226
## 6239	1.405377e+00	0.18563450	0.0009497643	0.9846449
## 6369	1.312923e-01	-0.04602935	0.0004476920	0.9987083
## 6422	-6.050211e-04	-0.08892755	0.0018809106	1.0003915
## 6429	4.325011e+00	0.52699938	0.0028075358	0.9583163
## 6430	4.100132e+00	0.49237599	0.0053456605	0.9849287
## 6431	4.366975e+00	0.52531572	0.0041227691	0.9739190
## 6432	4.400038e+00	0.53121391	0.0033759115	0.9657018
## 6433	4.412140e+00	0.55229377	0.0032953633	0.9616260
## 6434	4.412120e+00	0.55228497	0.0032952047	0.9616252
## 6435	4.123526e+00	0.54129823	0.0026890747	0.9537670
## 6436	4.386351e+00	0.52769545	0.0039185945	0.9718571
## 6437	4.226156e+00	0.50771283	0.0048854060	0.9810937
## 6438	4.073815e+00	0.48875016	0.0052175579	0.9846025
## 6439	4.370621e+00	0.53005051	0.0030504700	0.9615845
## 6440	4.173951e+00	0.53048123	0.0027755493	0.9571934
## 6441	4.297245e+00	0.53873158	0.0037205882	0.9685433
## 6442	4.383724e+00	0.53086776	0.0031549236	0.9629228
## 6443	3.777480e+00	0.49134930	0.0038156815	0.9752605
## 6444	3.741779e+00	0.49084077	0.0030587210	0.9675373
## 6445	3.552646e+00	0.44435170	0.0047310694	0.9859571
## 6446	3.741319e+00	0.47258607	0.0032681390	0.9724266
## 6447	3.649461e+00	0.48255676	0.0026213034	0.9626058
## 6448	3.721691e+00	0.44787214	0.0041760137	0.9825266
## 6449	3.688034e+00	0.47285159	0.0023340209	0.9592256
## 6450	3.528099e+00	0.46280248	0.0020434335	0.9549449
## 6451	3.562933e+00	0.44572248	0.0046902873	0.9856316
## 6452	3.740060e+00	0.47268460	0.0032211577	0.9719180
## 6453	3.578747e+00	0.47599626	0.0024091538	0.9600767
## 6454	3.716616e+00	0.48868280	0.0029058053	0.9658559
## 6455	3.765882e+00	0.48900563	0.0040180467	0.9771618

## 6456	3.785658e+00	0.45581839	0.0038300764	0.9793563
## 6457	3.802919e+00	0.48151412	0.0026959245	0.9639417
## 6512	5.609414e-01	0.14638772	0.0009271109	0.9906717
## 6527	1.382885e-01	-0.12402811	0.0013696026	0.9966113
## 6545	1.731608e-01	-0.05277841	0.0004543151	0.9980638
## 6587	-9.294987e-02	-0.17912888	0.0071006505	1.0055144
## 6739	3.074880e-01	-0.10725114	0.0013721740	0.9979367
## 6740	8.740929e-02	-0.07825085	0.0012810762	0.9995215
## 6746	8.159290e-02	-0.13821696	0.0020343250	0.9981332
## 6767	-1.427014e-02	0.37335124	0.0218172344	1.0198033
## 6796	1.747324e-01	-0.05378915	0.0004654631	0.9980356
## 6821	2.276467e-01	-0.09875040	0.0009366015	0.9965576
## 6915	8.159290e-02	-0.13821696	0.0020343250	0.9981332
## 6924	5.431342e-03	-0.09429342	0.0018419291	1.0000623
## 6931	1.907926e-01	-0.05146204	0.0003896817	0.9976898
## 6938	6.306350e-01	0.10738081	0.0005943246	0.9920518
## 6939	4.777129e-01	0.11538788	0.0007551528	0.9930309
## 6940	7.496450e-01	0.10281714	0.0005991956	0.9928694
## 6941	7.475967e-01	0.10257028	0.0005941280	0.9928342
## 6942	5.443005e-01	0.11347791	0.0007448027	0.9931786
## 6943	5.104444e-01	0.14243390	0.0012548501	0.9942091
## 6944	5.128685e-01	0.12236463	0.0008501870	0.9931353
## 6945	6.306350e-01	0.10738081	0.0005943246	0.9920518
## 6946	7.477799e-01	0.10277672	0.0005969091	0.9928423
## 6947	7.674873e-01	0.10302677	0.0006216910	0.9931551
## 6948	7.758967e-01	0.10312561	0.0006345171	0.9933128
## 7039	1.486598e-01	0.08405140	0.0010684974	0.9984557
## 7066	1.365053e-01	-0.05176184	0.0005277718	0.9986283
## 7147	2.007486e-01	-0.11699467	0.0008166364	0.9934950
## 7167	1.530861e+00	0.24624205	0.0010627271	0.9753026
## 7210	6.371503e-01	0.18531520	0.0013209400	0.9897381
## 7211	8.650728e-01	0.18042903	0.0013907010	0.9910007
## 7388	-1.661561e-02	-0.08015229	0.0011535398	0.9990260
## 7389	8.664000e-02	-0.18394662	0.0029020959	0.9979526
## 7446	2.435896e+00	0.29557749	0.0025848622	0.9874241
## 7447	2.377957e+00	0.28828123	0.0029044094	0.9901257
## 7448	2.437455e+00	0.29576460	0.0025729911	0.9873209
## 7449	2.364939e+00	0.28692204	0.0027846751	0.9895688
## 7450	2.362229e+00	0.28654530	0.0027970632	0.9896769
## 7451	2.359460e+00	0.28616135	0.0028095085	0.9897852
## 7452	2.377967e+00	0.28827600	0.0029040813	0.9901243
## 7453	2.429249e+00	0.29470303	0.0026299427	0.9878250
## 7454	2.432674e+00	0.29514196	0.0026068472	0.9876221
## 7455	2.383753e+00	0.28899086	0.0028774332	0.9899098
## 7456	2.377956e+00	0.28828201	0.0029044577	0.9901259
## 7457	2.432678e+00	0.29516460	0.0026076854	0.9876255
## 7458	2.359484e+00	0.28612444	0.0028080911	0.9897804
## 7459	2.326285e+00	0.28195517	0.0031170884	0.9917703
## 7460	2.362229e+00	0.28654530	0.0027970632	0.9896769
## 7461	2.348758e+00	0.28470392	0.0030296515	0.9911068
## 7462	2.337833e+00	0.28336640	0.0030729253	0.9914376
## 7463	2.348759e+00	0.28470366	0.0030296308	0.9911068
## 7507	2.236650e-01	-0.15201005	0.0020145528	0.9971481
## 7629	-3.954589e-01	-0.49448470	0.0157837061	1.0093086

## 7649	1.922463e-01	-0.09387970	0.0010783604	0.9977396
## 7650	1.922181e-01	-0.09390038	0.0010786861	0.9977394
## 7722	-2.372813e-01	-0.35114776	0.0168801949	1.0142412
## 7791	1.772055e-01	-0.13405930	0.0020204875	0.9983497
## 7871	3.003244e-01	-0.27812140	0.0031838270	0.9923943
## 8016	1.151062e-01	-0.04140389	0.0003858534	0.9987813
## 8119	1.860830e-01	-0.08979198	0.0009223708	0.9973192
## 8154	1.927208e-01	-0.05433741	0.0004630528	0.9979586
## 8206	6.546310e-02	-0.07511794	0.0013067363	0.9997622
## 8232	2.255641e-01	-0.15265630	0.0020150862	0.9971047
## 8262	-6.329765e-01	-1.12100557	0.0157128350	0.9798878
## 8320	3.129107e-01	-0.26801016	0.0049915600	0.9987937
## 8377	1.027961e+00	-2.10204421	0.0625101736	1.0347633
## 8457	2.412413e-01	0.05802924	0.0005919600	0.9984077
## 8458	-1.661319e+01	-2.03631948	0.0147599078	0.8936394
## 8535	1.485848e-01	-0.06584015	0.0005279827	0.9971708
## 8541	1.813644e-01	-0.04354528	0.0004436977	0.9989180
## 8698	2.659040e-01	0.04367051	0.0003006976	0.9978118
## 8710	8.471004e-01	0.17320517	0.0009306274	0.9864801
## 8763	2.424292e-01	0.05011456	0.0004799500	0.9985077
## 8887	9.768666e-01	0.38417719	0.0027705997	0.9787324
## 8911	1.820463e-01	0.09951316	0.0015047057	0.9989074
## 8946	1.820463e-01	0.09951316	0.0015047057	0.9989074
## 9185	1.207415e-01	-0.04402194	0.0004433968	0.9988725
## 9210	3.266936e-02	-0.08032032	0.0009593370	0.9982937
## 9293	1.334063e-01	-0.12794558	0.0010411256	0.9942002
## 9420	1.646430e-01	-0.18005414	0.0060766123	1.0040962
## 9453	1.659433e-01	-0.06754052	0.0006103862	0.9975958
## 9507	-4.030870e-01	-0.50699661	0.0157820463	1.0089387
## 9528	4.896308e-01	-0.36035152	0.0026224432	0.9802881
## 9546	2.335169e-01	-0.07610660	0.0006013679	0.9965839
## 9613	5.758377e-02	-0.04629382	0.0005279895	0.9991024
## 9722	3.027386e-01	0.04750750	0.0003787051	0.9980680
## 10090	-2.904633e-01	-0.07767845	0.0012964609	0.9995954
## 10112	-4.615801e-01	-0.09893089	0.0010386336	0.9971189
## 10125	1.607739e-01	0.12192073	0.0020202430	0.9990638
## 10222	-6.628301e-01	-0.11792125	0.0013068956	0.9968229
## 10318	1.240968e-01	0.62959596	0.0218286674	1.0143561
## 10371	1.440466e-01	-0.13702195	0.0023671463	0.9991457
## 10418	2.239324e-01	-0.12417807	0.0020452594	0.9990045
## 10478	1.263466e-01	-0.05116171	0.0005087241	0.9985772
## 10623	1.762835e-01	-0.07097309	0.0006715541	0.9976444
## 10624	9.582933e-02	0.10535281	0.0018934157	0.9996323
## 10723	1.769290e-01	0.06691484	0.0007157620	0.9982678
## 10741	1.620077e-01	-0.05480604	0.0004762474	0.9980040
## 10787	4.571327e-01	0.10630527	0.0007452406	0.9941626
## 10958	2.536551e-01	-0.07609130	0.0006226643	0.9967600
## 10995	-5.085249e-02	-0.33049393	0.0039619085	0.9916712
## 11045	2.805485e-02	0.19685458	0.0092333372	1.0078333
## 11133	1.112589e-01	-0.07403470	0.0011015584	0.9992502
## 11165	2.401646e-01	0.09162480	0.0010978663	0.9980038
## 11289	7.582709e-01	0.10244166	0.0006032153	0.9929869
## 11306	6.923117e-02	0.11985389	0.0035558972	1.0021531
## 11347	1.167213e-01	-0.06702458	0.0006826130	0.9980832

```

## 11413 5.988948e-01 0.11916630 0.0014346460 0.9972954
## 11558 -1.484961e+01 -1.79320724 0.0154740206 0.9243579
## 11586 3.544887e-01 0.05943751 0.0006129285 0.9983937
## 11631 5.282114e-02 0.16148831 0.0046685468 1.0025555
## 11692 1.251584e-01 0.04804073 0.0005141383 0.9988883
## 11728 4.437085e-01 0.18179034 0.0051254998 1.0026162
## 11758 1.568642e-01 -0.14254514 0.0023707152 0.9988521
## 11772 1.543714e+00 0.47317833 0.0025658741 0.9632508
## 11817 1.585300e-01 -0.05641036 0.0005392004 0.9982557
## 11822 1.102882e+00 0.21009687 0.0010855427 0.9827787
## 11854 -2.418208e-01 -0.05025875 0.0006064178 0.9991314
## 11898 3.714205e-01 0.91821909 0.0331091701 1.0229165
## 11899 -1.297275e+00 -0.51460357 0.0379524213 1.0366832
## 11982 6.144032e-01 0.32145129 0.0031063165 0.9881936
## 12212 -2.433884e+00 -0.34034516 0.0037325684 0.9898481
## 12256 2.829135e-01 0.09813995 0.0012689077 0.9982016
## 12288 -5.094437e+00 -0.66747957 0.0045836681 0.9608674
## 12293 1.310188e-01 0.05992374 0.0008610419 0.9993842
## 12465 1.289283e-01 0.09029535 0.0014660983 0.9993433
## 12472 7.677333e-01 0.12657682 0.0009333865 0.9934251
## 12477 1.497898e-01 0.04939757 0.0005928335 0.9991408
## 12487 4.098648e-01 0.15753925 0.0015684037 0.9946824
## 12577 6.861179e-01 0.26109053 0.0019131462 0.9859096
## 12582 1.676125e+00 0.47100942 0.0023514171 0.9598853
## 12602 4.164996e-02 -0.10126676 0.0024796021 1.0010250
## 12643 2.353075e+00 0.41071757 0.0016546648 0.9558216
## 12686 1.868485e-01 -0.04877373 0.0004995185 0.9987463
## 12759 1.611969e-01 0.05153720 0.0004850957 0.9983999
## 12764 6.239184e-01 0.28297860 0.0023944219 0.9873958
## 12782 -4.391624e+00 -0.60481984 0.0043715824 0.9666649
## 12816 6.675273e-02 0.60109456 0.0238997821 1.0179335
## 12843 1.342092e-01 -0.05150325 0.0005263881 0.9986443
## 12850 -2.036529e+01 -2.61020478 0.0152325712 0.8300433
## 12854 1.390561e-01 0.06581047 0.0008136525 0.9988000
##      large.residual
## 6           TRUE
## 25          TRUE
## 92          TRUE
## 115         TRUE
## 172         TRUE
## 178         TRUE
## 222         TRUE
## 239         TRUE
## 246         TRUE
## 261         TRUE
## 287         TRUE
## 295         TRUE
## 300         TRUE
## 341         TRUE
## 359         TRUE
## 385         TRUE
## 396         TRUE
## 459         TRUE
## 475         TRUE

```

```
## 482      TRUE
## 508      TRUE
## 528      TRUE
## 576      TRUE
## 656      TRUE
## 661      TRUE
## 662      TRUE
## 670      TRUE
## 679      TRUE
## 742      TRUE
## 782      TRUE
## 784      TRUE
## 802      TRUE
## 811      TRUE
## 814      TRUE
## 853      TRUE
## 877      TRUE
## 916      TRUE
## 971      TRUE
## 998      TRUE
## 1009     TRUE
## 1099     TRUE
## 1119     TRUE
## 1141     TRUE
## 1142     TRUE
## 1155     TRUE
## 1179     TRUE
## 1207     TRUE
## 1345     TRUE
## 1368     TRUE
## 1380     TRUE
## 1387     TRUE
## 1442     TRUE
## 1486     TRUE
## 1492     TRUE
## 1504     TRUE
## 1543     TRUE
## 1550     TRUE
## 1633     TRUE
## 1650     TRUE
## 1716     TRUE
## 1745     TRUE
## 1870     TRUE
## 1904     TRUE
## 1959     TRUE
## 1962     TRUE
## 1963     TRUE
## 1964     TRUE
## 1976     TRUE
## 1977     TRUE
## 1978     TRUE
## 1979     TRUE
## 1980     TRUE
## 1981     TRUE
```

```
## 1982      TRUE
## 2020      TRUE
## 2022      TRUE
## 2099      TRUE
## 2115      TRUE
## 2137      TRUE
## 2157      TRUE
## 2167      TRUE
## 2243      TRUE
## 2302      TRUE
## 2360      TRUE
## 2361      TRUE
## 2379      TRUE
## 2469      TRUE
## 2534      TRUE
## 2684      TRUE
## 2685      TRUE
## 2686      TRUE
## 2687      TRUE
## 2688      TRUE
## 2689      TRUE
## 2690      TRUE
## 2699      TRUE
## 2708      TRUE
## 2709      TRUE
## 2710      TRUE
## 2717      TRUE
## 2742      TRUE
## 2852      TRUE
## 2934      TRUE
## 2937      TRUE
## 3065      TRUE
## 3097      TRUE
## 3102      TRUE
## 3168      TRUE
## 3169      TRUE
## 3175      TRUE
## 3182      TRUE
## 3183      TRUE
## 3184      TRUE
## 3185      TRUE
## 3186      TRUE
## 3187      TRUE
## 3188      TRUE
## 3189      TRUE
## 3191      TRUE
## 3198      TRUE
## 3199      TRUE
## 3200      TRUE
## 3201      TRUE
## 3202      TRUE
## 3260      TRUE
## 3357      TRUE
## 3424      TRUE
```

```
## 3464      TRUE
## 3468      TRUE
## 3474      TRUE
## 3478      TRUE
## 3479      TRUE
## 3480      TRUE
## 3481      TRUE
## 3482      TRUE
## 3483      TRUE
## 3484      TRUE
## 3494      TRUE
## 3495      TRUE
## 3496      TRUE
## 3497      TRUE
## 3523      TRUE
## 3710      TRUE
## 3810      TRUE
## 3837      TRUE
## 3918      TRUE
## 3919      TRUE
## 4055      TRUE
## 4056      TRUE
## 4200      TRUE
## 4285      TRUE
## 4435      TRUE
## 4571      TRUE
## 4648      TRUE
## 4649      TRUE
## 4671      TRUE
## 4696      TRUE
## 4821      TRUE
## 4834      TRUE
## 4840      TRUE
## 4934      TRUE
## 4955      TRUE
## 4956      TRUE
## 5024      TRUE
## 5083      TRUE
## 5363      TRUE
## 5491      TRUE
## 5494      TRUE
## 5495      TRUE
## 5496      TRUE
## 5498      TRUE
## 5549      TRUE
## 5559      TRUE
## 5648      TRUE
## 5935      TRUE
## 6230      TRUE
## 6231      TRUE
## 6232      TRUE
## 6233      TRUE
## 6234      TRUE
## 6235      TRUE
```

```
## 6236      TRUE
## 6237      TRUE
## 6238      TRUE
## 6239      TRUE
## 6369      TRUE
## 6422      TRUE
## 6429      TRUE
## 6430      TRUE
## 6431      TRUE
## 6432      TRUE
## 6433      TRUE
## 6434      TRUE
## 6435      TRUE
## 6436      TRUE
## 6437      TRUE
## 6438      TRUE
## 6439      TRUE
## 6440      TRUE
## 6441      TRUE
## 6442      TRUE
## 6443      TRUE
## 6444      TRUE
## 6445      TRUE
## 6446      TRUE
## 6447      TRUE
## 6448      TRUE
## 6449      TRUE
## 6450      TRUE
## 6451      TRUE
## 6452      TRUE
## 6453      TRUE
## 6454      TRUE
## 6455      TRUE
## 6456      TRUE
## 6457      TRUE
## 6512      TRUE
## 6527      TRUE
## 6545      TRUE
## 6587      TRUE
## 6739      TRUE
## 6740      TRUE
## 6746      TRUE
## 6767      TRUE
## 6796      TRUE
## 6821      TRUE
## 6915      TRUE
## 6924      TRUE
## 6931      TRUE
## 6938      TRUE
## 6939      TRUE
## 6940      TRUE
## 6941      TRUE
## 6942      TRUE
## 6943      TRUE
```

```
## 6944      TRUE
## 6945      TRUE
## 6946      TRUE
## 6947      TRUE
## 6948      TRUE
## 7039      TRUE
## 7066      TRUE
## 7147      TRUE
## 7167      TRUE
## 7210      TRUE
## 7211      TRUE
## 7388      TRUE
## 7389      TRUE
## 7446      TRUE
## 7447      TRUE
## 7448      TRUE
## 7449      TRUE
## 7450      TRUE
## 7451      TRUE
## 7452      TRUE
## 7453      TRUE
## 7454      TRUE
## 7455      TRUE
## 7456      TRUE
## 7457      TRUE
## 7458      TRUE
## 7459      TRUE
## 7460      TRUE
## 7461      TRUE
## 7462      TRUE
## 7463      TRUE
## 7507      TRUE
## 7629      TRUE
## 7649      TRUE
## 7650      TRUE
## 7722      TRUE
## 7791      TRUE
## 7871      TRUE
## 8016      TRUE
## 8119      TRUE
## 8154      TRUE
## 8206      TRUE
## 8232      TRUE
## 8262      TRUE
## 8320      TRUE
## 8377      TRUE
## 8457      TRUE
## 8458      TRUE
## 8535      TRUE
## 8541      TRUE
## 8698      TRUE
## 8710      TRUE
## 8763      TRUE
## 8887      TRUE
```

```
## 8911      TRUE
## 8946      TRUE
## 9185      TRUE
## 9210      TRUE
## 9293      TRUE
## 9420      TRUE
## 9453      TRUE
## 9507      TRUE
## 9528      TRUE
## 9546      TRUE
## 9613      TRUE
## 9722      TRUE
## 10090     TRUE
## 10112     TRUE
## 10125     TRUE
## 10222     TRUE
## 10318     TRUE
## 10371     TRUE
## 10418     TRUE
## 10478     TRUE
## 10623     TRUE
## 10624     TRUE
## 10723     TRUE
## 10741     TRUE
## 10787     TRUE
## 10958     TRUE
## 10995     TRUE
## 11045     TRUE
## 11133     TRUE
## 11165     TRUE
## 11289     TRUE
## 11306     TRUE
## 11347     TRUE
## 11413     TRUE
## 11558     TRUE
## 11586     TRUE
## 11631     TRUE
## 11692     TRUE
## 11728     TRUE
## 11758     TRUE
## 11772     TRUE
## 11817     TRUE
## 11822     TRUE
## 11854     TRUE
## 11898     TRUE
## 11899     TRUE
## 11982     TRUE
## 12212     TRUE
## 12256     TRUE
## 12288     TRUE
## 12293     TRUE
## 12465     TRUE
## 12472     TRUE
## 12477     TRUE
```

```

## 12487      TRUE
## 12577      TRUE
## 12582      TRUE
## 12602      TRUE
## 12643      TRUE
## 12686      TRUE
## 12759      TRUE
## 12764      TRUE
## 12782      TRUE
## 12816      TRUE
## 12843      TRUE
## 12850      TRUE
## 12854      TRUE

#Observation: Only 356 records returned as True

# 11. Investigate further by calculating the leverage, cooks distance, and covariance ratios. Comment on

nrow(lrg_residuals)/nrow(housing_df)

## [1] 0.02767198

#Only 2.7% cases have absolute value
problem <- lrg_residuals[, c("cooks_distance", "leverage", "covariance_ratios")]
problem

##          cooks_distance      leverage covariance_ratios
## 6        5.302677e-04 0.0004428224      0.9975606
## 25       2.571517e-03 0.0012684339      0.9960724
## 92       1.085535e-03 0.0009594181      0.9982626
## 115      1.492540e-01 0.0087032525      0.9621597
## 172      3.008999e-04 0.0004402214      0.9989944
## 178      3.619159e-03 0.0012510952      0.9936448
## 222      3.544852e-04 0.0004049720      0.9984228
## 239      7.494374e-04 0.0007982764      0.9986393
## 246      2.199971e-02 0.0039584527      0.9889765
## 261      2.125259e-02 0.0181925868      1.0157374
## 287      1.321970e-03 0.0006843873      0.9957538
## 295      8.801152e-01 0.1059352343      1.0959399
## 300      2.045682e-02 0.0038262668      0.9894274
## 341      5.920153e-04 0.0005146572      0.9977643
## 359      3.225114e-03 0.0014283287      0.9955900
## 385      6.093647e-03 0.0020007660      0.9939720
## 396      2.652846e-03 0.0011762790      0.9953447
## 459      7.000915e-03 0.0034121361      0.9981590
## 475      4.444424e-04 0.0005591511      0.9988022
## 482      1.199604e-02 0.0034215920      0.9941217
## 508      2.380215e-03 0.0024483888      1.0002024
## 528      2.668840e-03 0.0010404881      0.9943459
## 576      1.215804e-03 0.0013478444      0.9992932
## 656      6.924462e-04 0.0008120534      0.9988938
## 661      5.736900e-03 0.0035827826      0.9995875
## 662      7.836860e-04 0.0011313979      0.9996614

```

## 670	4.263541e-03	0.0008975727	0.9881345
## 679	2.977055e-02	0.0031001947	0.9769801
## 742	5.611875e-04	0.0005900004	0.9983962
## 782	1.879642e-03	0.0014117698	0.9981578
## 784	3.051313e-03	0.0020016368	0.9982112
## 802	1.245220e-03	0.0013292915	0.9991775
## 811	1.006827e-02	0.0013187069	0.9805923
## 814	3.560322e-03	0.0021151772	0.9978821
## 853	8.497820e-04	0.0008527985	0.9985329
## 877	2.531156e-03	0.0013779829	0.9967134
## 916	1.892597e-02	0.0029652751	0.9856975
## 971	7.338257e-03	0.0107654902	1.0094467
## 998	6.014777e-04	0.0006364963	0.9984600
## 1009	5.634264e-04	0.0004674859	0.9975637
## 1099	8.309295e-04	0.0011852227	0.9996919
## 1119	8.112489e-03	0.0018078389	0.9897754
## 1141	7.396733e-04	0.0008921746	0.9990402
## 1142	4.596649e-03	0.0013022640	0.9919254
## 1155	2.707558e-02	0.0095568270	1.0022109
## 1179	5.704496e-04	0.0007348446	0.9990301
## 1207	1.540118e-02	0.0044190989	0.9951854
## 1345	5.612469e-04	0.0005186800	0.9979590
## 1368	1.192847e-03	0.0011920846	0.9988614
## 1380	4.505301e-04	0.0005010792	0.9984526
## 1387	7.287859e-04	0.0007558099	0.9985257
## 1442	1.522882e+00	0.0190081592	0.8150460
## 1486	8.689048e-04	0.0008580394	0.9984929
## 1492	1.881858e-03	0.0012070006	0.9973167
## 1504	1.901599e-02	0.0032051120	0.9871801
## 1543	1.169603e-03	0.0015071983	0.9998053
## 1550	2.371999e-03	0.0009594344	0.9945228
## 1633	3.134076e-04	0.0004429138	0.9989297
## 1650	6.802771e-02	0.0056715017	0.9730413
## 1716	1.596564e-03	0.0006637515	0.9944129
## 1745	2.174104e-03	0.0009664418	0.9951502
## 1870	5.978306e-03	0.0065341235	1.0044870
## 1904	9.266789e-04	0.0006416649	0.9970709
## 1959	8.957805e-04	0.0012332661	0.9996694
## 1962	4.991903e-03	0.0012971331	0.9910353
## 1963	5.831651e-04	0.0005971333	0.9983322
## 1964	7.036638e-01	0.0150465986	0.8916039
## 1976	4.361510e-03	0.0009736963	0.9889610
## 1977	3.545697e-03	0.0008220054	0.9892688
## 1978	3.983699e-03	0.0009276993	0.9894282
## 1979	3.534656e-03	0.0008078502	0.9890829
## 1980	4.084244e-03	0.0009940877	0.9900096
## 1981	5.863856e-03	0.0013164159	0.9893737
## 1982	4.510441e-03	0.0010331482	0.9893355
## 2020	2.349210e-03	0.0019668075	0.9990975
## 2022	1.813378e-02	0.0037745716	0.9908762
## 2099	1.048074e-03	0.0007567772	0.9973517
## 2115	7.794924e-04	0.0007598105	0.9983574
## 2137	8.093061e-04	0.0006518040	0.9976466
## 2157	2.956387e-04	0.0003073830	0.9980835

## 2167	5.012321e-03	0.0030063546	0.9988228
## 2243	2.031804e-03	0.0018960037	0.9993694
## 2302	1.803175e-02	0.0047519609	0.9946620
## 2360	6.935262e-04	0.0006373196	0.9980607
## 2361	1.483646e+01	0.0550943893	0.4959893
## 2379	7.972416e-03	0.0020808346	0.9918694
## 2469	7.286259e-04	0.0006204770	0.9978033
## 2534	8.921500e-04	0.0008188152	0.9982387
## 2684	4.517266e-03	0.0011620785	0.9907921
## 2685	3.661845e-03	0.0008506409	0.9893215
## 2686	4.083425e-03	0.0008737432	0.9883228
## 2687	3.754146e-03	0.0009120377	0.9899061
## 2688	3.320075e-03	0.0008065545	0.9897999
## 2689	3.986851e-03	0.0008511751	0.9882712
## 2690	3.790834e-03	0.0008539661	0.9889525
## 2699	2.823093e-02	0.0240635291	1.0218535
## 2708	2.371751e-03	0.0008213330	0.9932282
## 2709	2.742603e-03	0.0009689428	0.9935352
## 2710	2.888712e-03	0.0009763790	0.9931863
## 2717	6.448560e-03	0.0014405772	0.9894374
## 2742	8.666420e-04	0.0005483802	0.9965974
## 2852	4.191244e-02	0.0076538144	0.9929423
## 2934	1.594820e-03	0.0006636449	0.9944190
## 2937	1.530857e-03	0.0006597971	0.9946462
## 3065	1.370221e-03	0.0020022182	1.0005586
## 3097	5.485843e-03	0.0013109316	0.9901161
## 3102	1.405478e-03	0.0007557100	0.9960255
## 3168	3.696822e-02	0.0104908044	1.0012437
## 3169	3.912721e-02	0.0104502791	1.0005906
## 3175	7.271296e-03	0.0079950206	1.0059853
## 3182	3.696450e-02	0.0104904280	1.0012440
## 3183	3.697126e-02	0.0104911126	1.0012435
## 3184	3.697126e-02	0.0104911126	1.0012435
## 3185	3.696407e-02	0.0104903839	1.0012440
## 3186	3.696822e-02	0.0104908044	1.0012437
## 3187	3.696822e-02	0.0104908044	1.0012437
## 3188	3.910134e-02	0.0104481639	1.0005932
## 3189	7.272877e-03	0.0079953127	1.0059851
## 3191	7.273517e-03	0.0079954319	1.0059850
## 3198	3.695698e-02	0.0104896697	1.0012445
## 3199	3.695760e-02	0.0104897321	1.0012445
## 3200	3.697126e-02	0.0104911126	1.0012435
## 3201	3.697126e-02	0.0104911126	1.0012435
## 3202	3.697126e-02	0.0104911126	1.0012435
## 3260	4.930493e-04	0.0006102185	0.9988166
## 3357	1.576630e-03	0.0012815635	0.9983097
## 3424	1.185433e-03	0.0005694681	0.9952204
## 3464	7.019077e-03	0.0078535773	1.0058855
## 3468	7.017417e-03	0.0078532633	1.0058856
## 3474	7.013644e-03	0.0078525617	1.0058860
## 3478	3.565585e-02	0.0103073122	1.0012358
## 3479	3.565585e-02	0.0103073122	1.0012358
## 3480	3.565585e-02	0.0103073122	1.0012358
## 3481	3.565585e-02	0.0103073122	1.0012358

## 3482	3.565585e-02	0.0103073122	1.0012358
## 3483	3.565583e-02	0.0103073101	1.0012358
## 3484	3.775949e-02	0.0102676676	1.0005890
## 3494	7.017010e-03	0.0078531868	1.0058857
## 3495	3.565583e-02	0.0103073101	1.0012358
## 3496	3.565583e-02	0.0103073101	1.0012358
## 3497	3.565583e-02	0.0103073101	1.0012358
## 3523	9.863622e-04	0.0005433004	0.9959363
## 3710	2.245690e-04	0.0002833412	0.9985324
## 3810	3.840371e-04	0.0004126050	0.9982755
## 3837	1.015299e-03	0.0006051683	0.9963826
## 3918	5.453941e-03	0.0017888793	0.9937505
## 3919	3.109801e-03	0.0012845777	0.9949920
## 4055	2.008329e-03	0.0009516552	0.9955234
## 4056	9.796765e-02	0.0084008083	0.9767168
## 4200	5.075634e-04	0.0007556484	0.9993434
## 4285	8.288557e-04	0.0005410463	0.9967251
## 4435	6.905668e-04	0.0005051028	0.9971491
## 4571	5.663791e-04	0.0008036702	0.9992991
## 4648	2.931117e-01	0.0105827067	0.9360284
## 4649	5.347371e-01	0.0478428048	1.0198174
## 4671	1.464046e-02	0.0038992759	0.9939124
## 4696	2.610411e-03	0.0010215244	0.9943536
## 4821	2.286696e-02	0.0041488980	0.9892960
## 4834	1.352477e-02	0.0033004651	0.9923566
## 4840	2.835931e-02	0.0095632227	1.0018492
## 4934	5.604309e-04	0.0004771724	0.9976592
## 4955	1.579201e-03	0.0018725049	0.9999838
## 4956	1.579201e-03	0.0018725049	0.9999838
## 5024	3.356136e-03	0.0016619604	0.9964894
## 5083	1.259052e-01	0.0308350497	1.0209137
## 5363	2.093170e-02	0.0030996188	0.9848109
## 5491	1.912965e-04	0.0002828256	0.9988568
## 5494	1.902759e-04	0.0002766880	0.9988190
## 5495	1.920914e-04	0.0002843090	0.9988603
## 5496	1.913848e-04	0.0002829915	0.9988572
## 5498	1.984896e-04	0.0002753927	0.9987253
## 5549	8.397311e-04	0.0010891631	0.9994001
## 5559	1.169916e-03	0.0013805042	0.9994785
## 5648	5.884928e-04	0.0005919914	0.9982782
## 5935	5.361232e-03	0.0016324082	0.9929388
## 6230	5.815174e-03	0.0010369281	0.9858998
## 6231	5.726868e-03	0.0009496143	0.9846445
## 6232	6.115119e-03	0.0010111339	0.9846590
## 6233	5.913691e-03	0.0011394930	0.9871597
## 6234	6.972358e-03	0.0012712083	0.9864755
## 6235	6.991002e-03	0.0012848828	0.9866105
## 6236	6.971847e-03	0.0012710841	0.9864750
## 6237	6.991246e-03	0.0012849433	0.9866108
## 6238	5.963844e-03	0.0012075564	0.9879226
## 6239	5.727661e-03	0.0009497643	0.9846449
## 6369	3.530144e-04	0.0004476920	0.9987083
## 6422	1.317691e-03	0.0018809106	1.0003915
## 6429	4.593922e-02	0.0028075358	0.9583163

## 6430	4.026756e-02	0.0053456605	0.9849287
## 6431	4.575912e-02	0.0041227691	0.9739190
## 6432	4.673225e-02	0.0033759115	0.9657018
## 6433	5.047982e-02	0.0032953633	0.9616260
## 6434	5.047821e-02	0.0032952047	0.9616252
## 6435	4.842847e-02	0.0026890747	0.9537670
## 6436	4.615991e-02	0.0039185945	0.9718571
## 6437	4.279066e-02	0.0048854060	0.9810937
## 6438	3.967535e-02	0.0052175579	0.9846025
## 6439	4.649719e-02	0.0030504700	0.9615845
## 6440	4.653941e-02	0.0027755493	0.9571934
## 6441	4.808508e-02	0.0037205882	0.9685433
## 6442	4.665068e-02	0.0031549236	0.9629228
## 6443	4.004419e-02	0.0038156815	0.9752605
## 6444	3.991348e-02	0.0030587210	0.9675373
## 6445	3.280466e-02	0.0047310694	0.9859571
## 6446	3.702967e-02	0.0032681390	0.9724266
## 6447	3.854757e-02	0.0026213034	0.9626058
## 6448	3.331026e-02	0.0041760137	0.9825266
## 6449	3.699271e-02	0.0023340209	0.9592256
## 6450	3.541238e-02	0.0020434335	0.9549449
## 6451	3.300578e-02	0.0046902873	0.9856316
## 6452	3.704217e-02	0.0032211577	0.9719180
## 6453	3.749145e-02	0.0024091538	0.9600767
## 6454	3.955283e-02	0.0029058053	0.9658559
## 6455	3.967462e-02	0.0040180467	0.9771618
## 6456	3.448616e-02	0.0038300764	0.9793563
## 6457	3.838957e-02	0.0026959245	0.9639417
## 6512	3.565435e-03	0.0009271109	0.9906717
## 6527	2.561793e-03	0.0013696026	0.9966113
## 6545	4.640751e-04	0.0004543151	0.9980638
## 6587	5.346409e-03	0.0071006505	1.0055144
## 6739	1.916036e-03	0.0013721740	0.9979367
## 6740	1.020233e-03	0.0012810762	0.9995215
## 6746	3.181916e-03	0.0020343250	0.9981332
## 6767	2.322238e-02	0.0218172344	1.0198033
## 6796	4.820166e-04	0.0004654631	0.9980356
## 6821	1.624086e-03	0.0009366015	0.9965576
## 6915	3.181916e-03	0.0020343250	0.9981332
## 6924	1.481435e-03	0.0018419291	1.0000623
## 6931	4.411915e-04	0.0003896817	0.9976898
## 6938	1.919029e-03	0.0005943246	0.9920518
## 6939	2.216197e-03	0.0007551528	0.9930309
## 6940	1.759618e-03	0.0005991956	0.9928694
## 6941	1.751170e-03	0.0005941280	0.9928342
## 6942	2.143493e-03	0.0007448027	0.9931786
## 6943	3.377258e-03	0.0012548501	0.9942091
## 6944	2.492300e-03	0.0008501870	0.9931353
## 6945	1.919029e-03	0.0005943246	0.9920518
## 6946	1.758228e-03	0.0005969091	0.9928423
## 6947	1.766879e-03	0.0006216910	0.9931551
## 6948	1.770314e-03	0.0006345171	0.9933128
## 7039	1.176927e-03	0.0010684974	0.9984557
## 7066	4.464066e-04	0.0005277718	0.9986283

## 7147	2.278502e-03	0.0008166364	0.9934950
## 7167	1.006204e-02	0.0010627271	0.9753026
## 7210	5.712531e-03	0.0013209400	0.9897381
## 7211	5.416347e-03	0.0013907010	0.9910007
## 7388	1.070352e-03	0.0011535398	0.9990260
## 7389	5.634737e-03	0.0029020959	0.9979526
## 7446	1.452406e-02	0.0025848622	0.9874241
## 7447	1.382142e-02	0.0029044094	0.9901257
## 7448	1.454223e-02	0.0025729911	0.9873209
## 7449	1.369039e-02	0.0027846751	0.9895688
## 7450	1.365468e-02	0.0027970632	0.9896769
## 7451	1.361833e-02	0.0028095085	0.9897852
## 7452	1.382092e-02	0.0029040813	0.9901243
## 7453	1.443912e-02	0.0026299427	0.9878250
## 7454	1.448172e-02	0.0026068472	0.9876221
## 7455	1.388911e-02	0.0028774332	0.9899098
## 7456	1.382150e-02	0.0029044577	0.9901259
## 7457	1.448395e-02	0.0026076854	0.9876255
## 7458	1.361481e-02	0.0028080911	0.9897804
## 7459	1.322467e-02	0.0031170884	0.9917703
## 7460	1.365468e-02	0.0027970632	0.9896769
## 7461	1.348247e-02	0.0030296515	0.9911068
## 7462	1.335673e-02	0.0030729253	0.9914376
## 7463	1.348244e-02	0.0030296308	0.9911068
## 7507	3.848049e-03	0.0020145528	0.9971481
## 7629	4.070742e-02	0.0157837061	1.0093086
## 7649	1.468082e-03	0.0010783604	0.9977396
## 7650	1.468729e-03	0.0010786861	0.9977394
## 7722	2.054092e-02	0.0168801949	1.0142412
## 7791	2.993483e-03	0.0020204875	0.9983497
## 7871	1.286868e-02	0.0031838270	0.9923943
## 8016	2.856372e-04	0.0003858534	0.9987813
## 8119	1.342959e-03	0.0009223708	0.9973192
## 8154	4.918867e-04	0.0004630528	0.9979586
## 8206	9.402087e-04	0.0013067363	0.9997622
## 8232	3.880810e-03	0.0020150862	0.9971047
## 8262	2.081840e-01	0.0157128350	0.9798878
## 8320	1.195919e-02	0.0049915600	0.9987937
## 8377	7.327127e-01	0.0625101736	1.0347633
## 8457	5.610277e-04	0.0005919600	0.9984077
## 8458	6.765886e-01	0.0147599078	0.8936394
## 8535	7.220829e-04	0.0005279827	0.9971708
## 8541	3.159516e-04	0.0004436977	0.9989180
## 8698	3.177203e-04	0.0003006976	0.9978118
## 8710	4.987900e-03	0.0009306274	0.9864801
## 8763	4.184406e-04	0.0004799500	0.9985077
## 8887	2.449938e-02	0.0027705997	0.9787324
## 8911	1.649763e-03	0.0015047057	0.9989074
## 8946	1.649763e-03	0.0015047057	0.9989074
## 9185	3.229039e-04	0.0004433968	0.9988725
## 9210	1.074748e-03	0.0009593370	0.9982937
## 9293	2.725228e-03	0.0010411256	0.9942002
## 9420	5.401441e-03	0.0060766123	1.0040962
## 9453	7.599047e-04	0.0006103862	0.9975958

## 9507	4.279091e-02	0.0157820463	1.0089387
## 9528	2.156107e-02	0.0026224432	0.9802881
## 9546	9.647220e-04	0.0006013679	0.9965839
## 9613	3.571013e-04	0.0005279895	0.9991024
## 9722	3.760154e-04	0.0003787051	0.9980680
## 10090	1.005372e-03	0.0012964609	0.9995954
## 10112	1.630154e-03	0.0010386336	0.9971189
## 10125	2.476222e-03	0.0020202430	0.9990638
## 10222	2.315836e-03	0.0013068956	0.9968229
## 10318	6.597917e-02	0.0218286674	1.0143561
## 10371	3.127488e-03	0.0023671463	0.9991457
## 10418	2.568729e-03	0.0020452594	0.9990045
## 10478	4.361130e-04	0.0005087241	0.9985772
## 10623	8.391060e-04	0.0006715541	0.9976444
## 10624	1.849171e-03	0.0018934157	0.9996323
## 10723	7.459614e-04	0.0007157620	0.9982678
## 10741	5.004106e-04	0.0004762474	0.9980040
## 10787	1.881398e-03	0.0007452406	0.9941626
## 10958	9.643591e-04	0.0006226643	0.9967600
## 10995	1.816699e-02	0.0039619085	0.9916712
## 11045	6.457035e-03	0.0092333372	1.0078333
## 11133	9.132407e-04	0.0011015584	0.9992502
## 11165	1.398462e-03	0.0010978663	0.9980038
## 11289	1.746823e-03	0.0006032153	0.9929869
## 11306	2.393596e-03	0.0035558972	1.0021531
## 11347	7.483911e-04	0.0006826130	0.9980832
## 11413	2.365134e-03	0.0014346460	0.9972954
## 11558	5.275791e-01	0.0154740206	0.9243579
## 11586	5.885851e-04	0.0006129285	0.9983937
## 11631	4.344872e-03	0.0046685468	1.0025555
## 11692	3.845477e-04	0.0005141383	0.9988883
## 11728	5.505636e-03	0.0051254998	1.0026162
## 11758	3.384532e-03	0.0023707152	0.9988521
## 11772	3.706828e-02	0.0025658741	0.9632508
## 11817	5.301529e-04	0.0005392004	0.9982557
## 11822	7.334186e-03	0.0010855427	0.9827787
## 11854	4.208869e-04	0.0006064178	0.9991314
## 11898	1.402634e-01	0.0331091701	1.0229165
## 11899	4.411654e-02	0.0379524213	1.0366832
## 11982	1.717886e-02	0.0031063165	0.9881936
## 12212	1.926099e-02	0.0037325684	0.9898481
## 12256	1.604420e-03	0.0012689077	0.9982016
## 12288	7.370598e-02	0.0045836681	0.9608674
## 12293	5.983284e-04	0.0008610419	0.9993842
## 12465	1.358394e-03	0.0014660983	0.9993433
## 12472	2.666933e-03	0.0009333865	0.9934251
## 12477	4.065883e-04	0.0005928335	0.9991408
## 12487	4.131681e-03	0.0015684037	0.9946824
## 12577	1.133092e-02	0.0019131462	0.9859096
## 12582	3.670913e-02	0.0023514171	0.9598853
## 12602	1.708744e-03	0.0024796021	1.0010250
## 12643	2.789619e-02	0.0016546648	0.9558216
## 12686	3.963635e-04	0.0004995185	0.9987463
## 12759	4.425266e-04	0.0004850957	0.9983999

```

## 12764 1.331264e-02 0.0023944219      0.9873958
## 12782 6.058006e-02 0.0043715824      0.9666649
## 12816 6.015476e-02 0.0238997821      1.0179335
## 12843 4.419587e-04 0.0005263881      0.9986443
## 12850 1.098003e+00 0.0152325712      0.8300433
## 12854 7.215939e-04 0.0008136525      0.9988000

print(nrow(problem))

## [1] 356

cooks_check <- problem %>% filter(cooks_distance>1)
nrow(cooks_check)

## [1] 3

# Out of 356 rows, 3 rows are having cooks distance greater than 1 which indicates influential values. To
# Next we will check for leverage
k = 5
n = nrow(housing_df)
avg_leverage = (k+1)/n

threshold_1 <- avg_leverage*2
threshold_2 <- avg_leverage*3

r_threshold_1 <- problem[problem$leverage > threshold_1,]
r_threshold_2 <- problem[problem$leverage > threshold_2,]

print(nrow(r_threshold_1))

## [1] 246

print(nrow(r_threshold_2))

## [1] 181

#Observation,
#Of 356 rows, 246 are greater than double the average leverage and 181 are greater than 3 times of average leverage

#Covariance ratios
u_cvr <- 1 + threshold_2
l_cvr <- 1 - threshold_2

r_u_cvr <- problem[problem$covariance_ratios > u_cvr,]
r_l_cvr <- problem[problem$covariance_ratios > l_cvr,]

print(nrow((r_u_cvr)))

## [1] 31

```

```

print(nrow((r_l_cvr)))

## [1] 117

#Observation: There are 31 cases greater than upper covaraince and 117 rows greater than lower limits

# 12. Perform the necessary calculations to assess the assumption of independence and state if the cond

library('car')

## Loading required package: carData

## 
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':
## 
##     recode

dwt(multisqftprice_lm)

##   lag Autocorrelation D-W Statistic p-value
##   1      0.3066934    1.386602      0
## Alternative hypothesis: rho != 0

#The condition is somewhat met since statistic value is 1.3 which is more or less greater than 1 and cl

# 13. Perform the necessary calculations to assess the assumption of no multicollinearity and state if

print("VIF")

## [1] "VIF"

vif(multisqftprice_lm)

##          sq_ft_lot      bath_full_count      bedrooms
##          1.081545        1.378717        1.525921
## square_feet_total_living      price_per_sq_ft
##          2.015071        1.045117

print("Tolerance")

## [1] "Tolerance"

1/vif(multisqftprice_lm)

##          sq_ft_lot      bath_full_count      bedrooms
##          0.9246032       0.7253122       0.6553418
## square_feet_total_living      price_per_sq_ft
##          0.4962604       0.9568304

```

```

print("Average VIF")

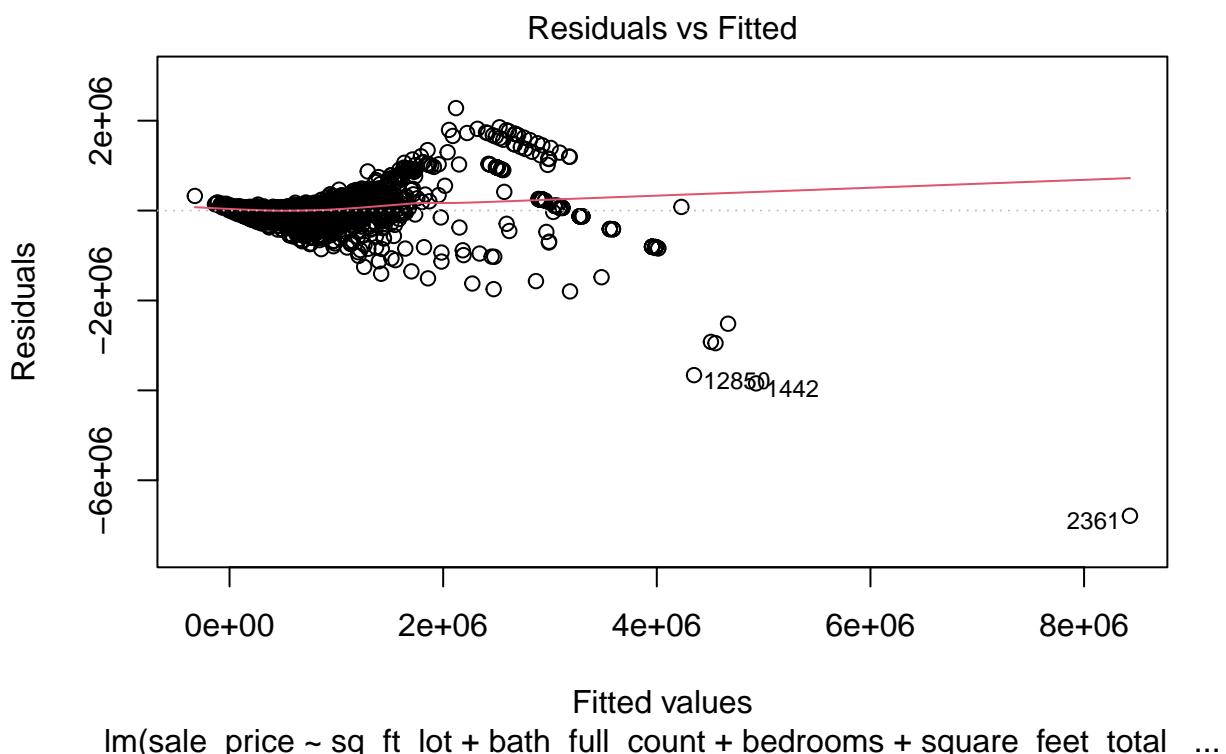
## [1] "Average VIF"

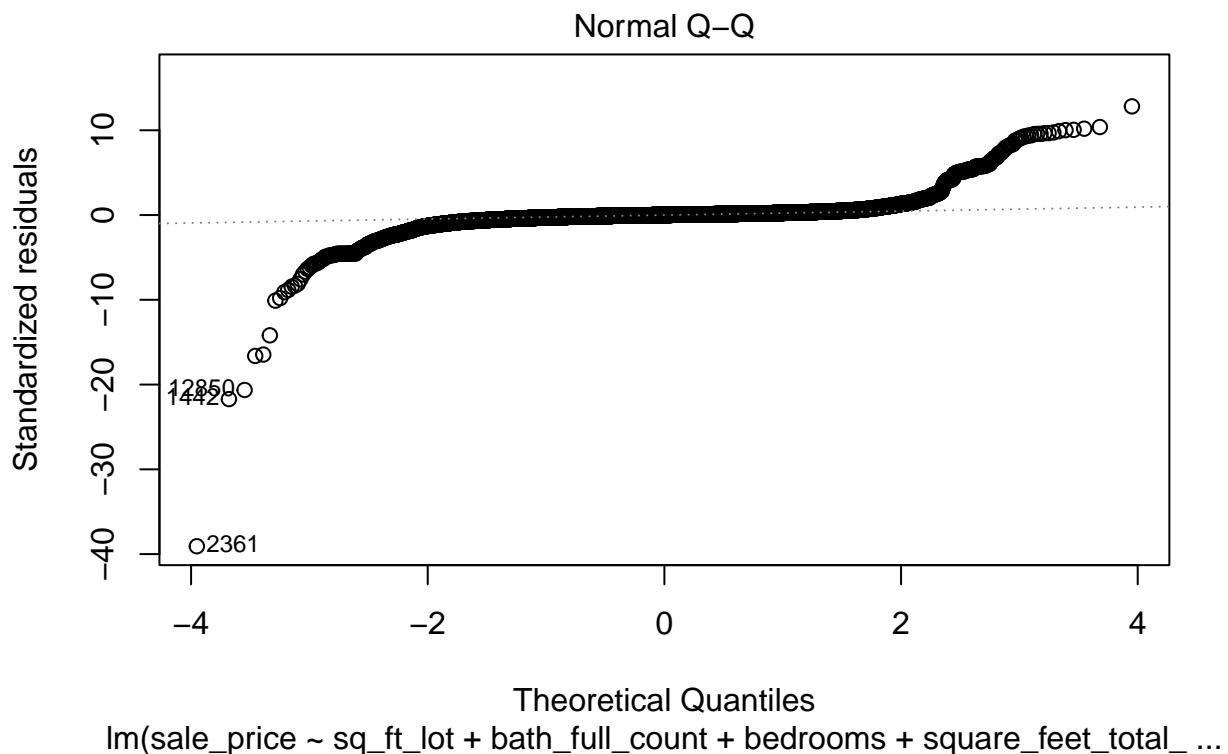
mean(vif(multisqftprice_lm))

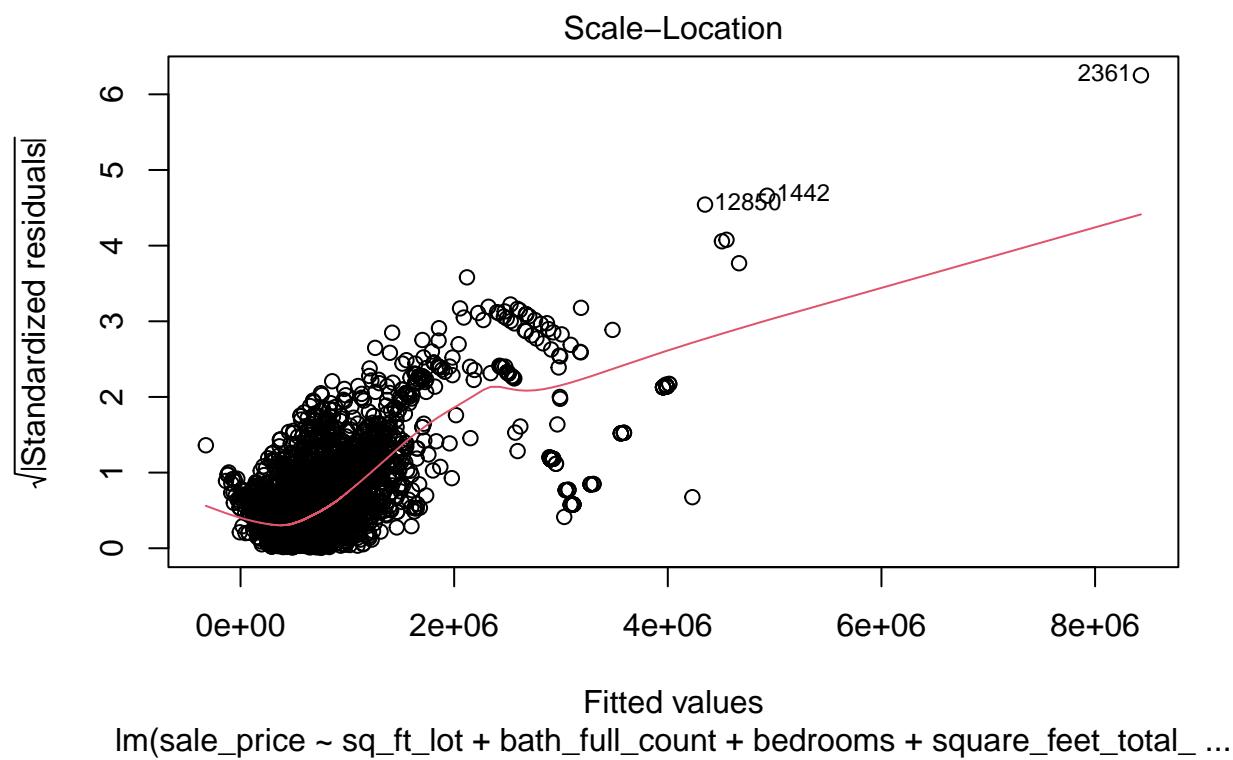
## [1] 1.409274

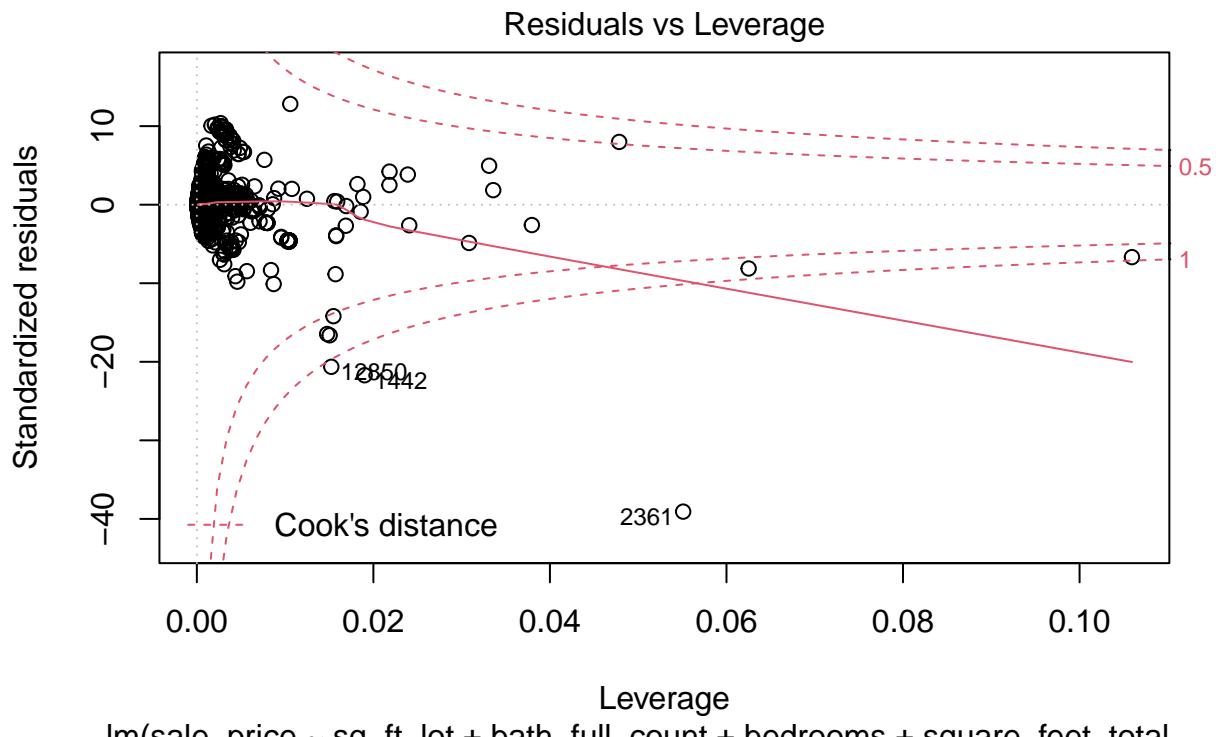
#Oberservation: The VIF values are all below 10. The tolerance statistic are above .2 and average is sl
# 14. Visually check the assumptions related to the residuals using the plot() and hist() functions. Su
plot(multisqftprice_lm)

```



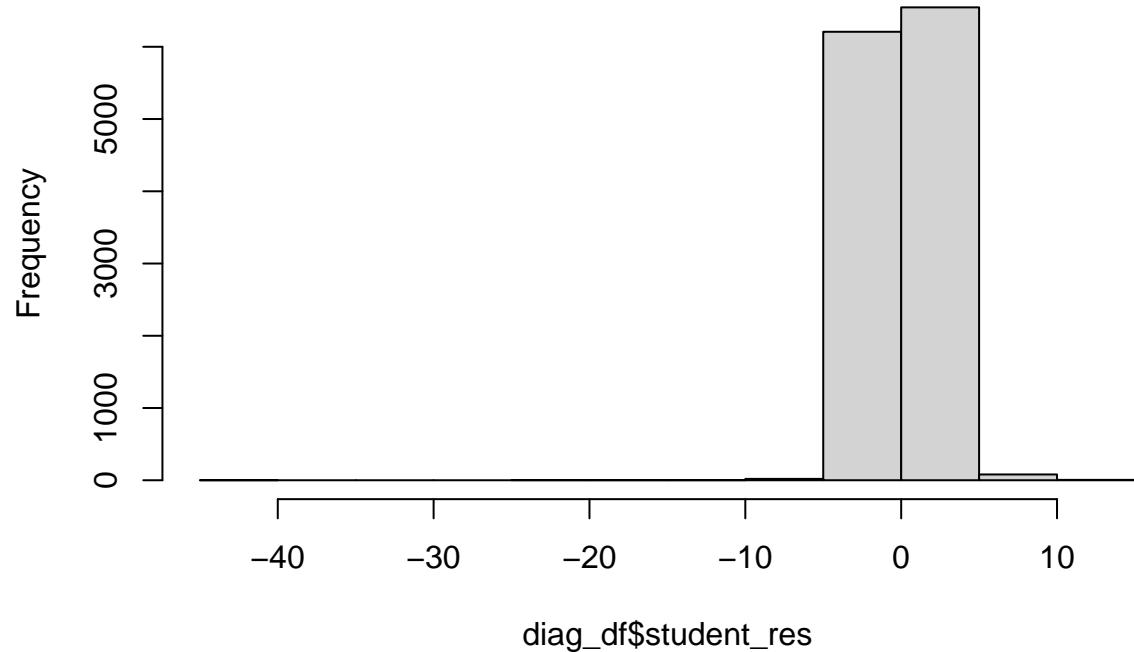






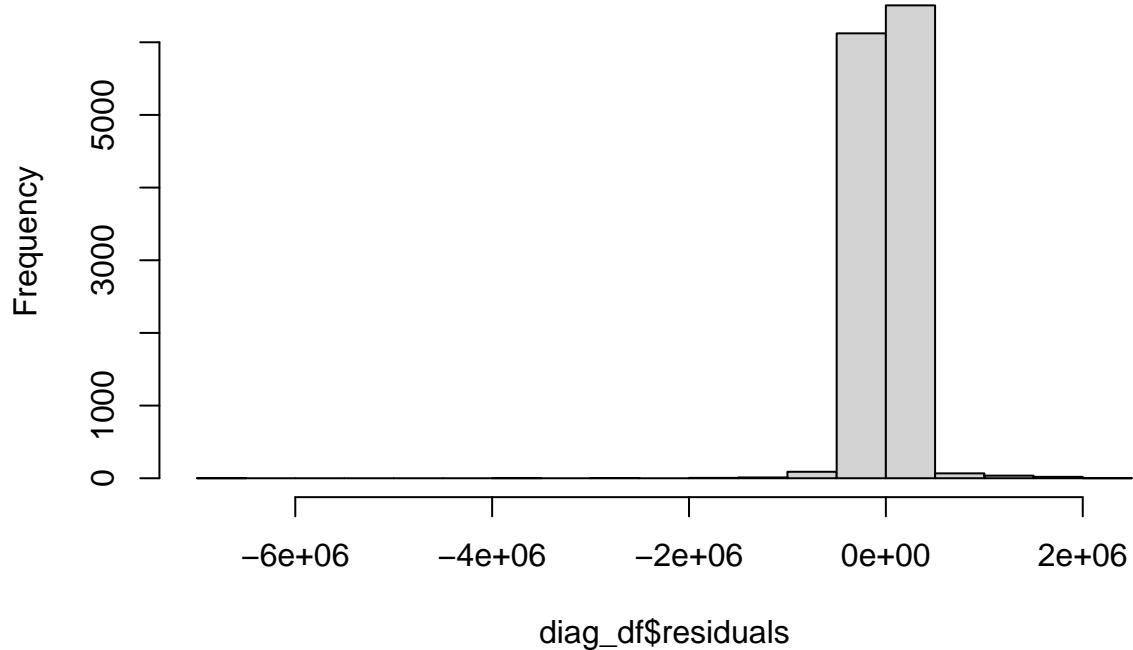
```
hist(diag_df$student_res)
```

Histogram of diag_df\$student_res



```
hist(diag_df$residuals)
```

Histogram of diag_df\$residuals



15. Overall, is this regression model unbiased? If an unbiased regression model, what does this tell us?

#Observation: Overall, the model is biased with 356 outliers and 427 influential cases.