```
import sqlite3
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from collections import defaultdict
from matplotlib import pyplot
```

PROBLEM 1

```
sqlite_file = 'lahman2014.sqlite'
conn = sqlite3.connect(sqlite_file)
#the total payroll
salary_query = "SELECT teamID, yearID, sum(salary) as total_payroll
FROM Salaries GROUP BY teamID, yearID ORDER BY teamID, yearID"
team_salaries = pd.read_sql(salary_query, conn)
#winning percentage
team_query = "SELECT teamID, yearID, W as number_of_wins, W as
number_of_games, (W*100.0/G) as win_percentage FROM teams GROUP BY
teamID, yearID ORDER BY teamID, yearID"
win_percentage = pd.read_sql(team_query, conn)
#merge them into one SQL table
data = team_salaries.merge(win_percentage, how = "inner", left_on =
["teamID", "yearID"], right_on = ["teamID", "yearID"])
data
```

| | teamID | yearID | total_payroll | number_of_wins | number_of_games | \ |
|---|---|---|---|---|---|---|
| 0 | ANA | 1997 | 31135472.0 | 84 | 84 | |
| 1 | ANA | 1998 | 41281000.0 | 85 | 85 | |
| 2 | ANA | 1999 | 55388166.0 | 70 | 70 | |
| 3 | ANA | 2000 | 51464167.0 | 82 | 82 | |
| 4 | ANA | 2001 | 47535167.0 | 75 | 75 | |
| 5 | ANA | 2002 | 61721667.0 | 99 | 99 | |
| 6 | ANA | 2003 | 79031667.0 | 77 | 77 | |
| 7 | ANA | 2004 | 100534667.0 | 92 | 92 | |
| 8 | ARI | 1998 | 32347000.0 | 65 | 65 | |
| 9 | ARI | 1999 | 68703999.0 | 100 | 100 | |
| 10 | ARI | 2000 | 81027833.0 | 85 | 85 | |
| 11 | ARI | 2001 | 85082999.0 | 92 | 92 | |
| 12 | ARI | 2002 | 102819999.0 | 98 | 98 | |
| 13 | ARI | 2003 | 80657000.0 | 84 | 84 | |
| 14 | ARI | 2004 | 69780750.0 | 51 | 51 | |
| 15 | ARI | 2005 | 62329166.0 | 77 | 77 | |
| 16 | ARI | 2006 | 59684226.0 | 76 | 76 | |
| 17 | ARI | 2007 | 52067546.0 | 90 | 90 | |
| 18 | ARI | 2008 | 66202712.0 | 82 | 82 | |
| 19 | ARI | 2009 | 73115666.0 | 70 | 70 | |
| 20 | ARI | 2010 | 60718166.0 | 65 | 65 | |
| 21 | ARI | 2011 | 53639833.0 | 94 | 94 | |
| 22 | ARI | 2012 | 73804833.0 | 81 | 81 | |
| 23 | ARI | 2013 | 90132000.0 | 81 | 81 | |
| 24 | ARI | 2014 | 97861500.0 | 64 | 64 | |

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|---|---|---|---|---|---|
| 25 | ATL | 1985 | 14807000.0 | 66 | 66 |
| 26 | ATL | 1986 | 17102786.0 | 72 | 72 |
| 27 | ATL | 1987 | 16544560.0 | 69 | 69 |
| 28 | ATL | 1988 | 12728174.0 | 54 | 54 |
| 29 | ATL | 1989 | 11112334.0 | 63 | 63 |
| 30 | ATL | 1990 | 14555501.0 | 65 | 65 |
| 31 | ATL | 1991 | 18403500.0 | 94 | 94 |
| 32 | ATL | 1992 | 34625333.0 | 98 | 98 |
| 33 | ATL | 1993 | 41641417.0 | 104 | 104 |
| 34 | ATL | 1994 | 49383513.0 | 68 | 68 |
| 35 | ATL | 1995 | 47235445.0 | 90 | 90 |
| 36 | ATL | 1996 | 49698500.0 | 96 | 96 |
| 37 | ATL | 1997 | 52278500.0 | 101 | 101 |
| 38 | ATL | 1998 | 61186000.0 | 106 | 106 |
| 39 | ATL | 1999 | 73140000.0 | 103 | 103 |
| 40 | ATL | 2000 | 84537836.0 | 95 | 95 |
| 41 | ATL | 2001 | 91936166.0 | 88 | 88 |
| 42 | ATL | 2002 | 92870367.0 | 101 | 101 |
| 43 | ATL | 2003 | 106243667.0 | 101 | 101 |
| 44 | ATL | 2004 | 90182500.0 | 96 | 96 |
| 45 | ATL | 2005 | 86457302.0 | 90 | 90 |
| 46 | ATL | 2006 | 90156876.0 | 79 | 79 |
| 47 | ATL | 2007 | 87290833.0 | 84 | 84 |
| 48 | ATL | 2008 | 102365683.0 | 72 | 72 |
| 49 | ATL | 2009 | 96726166.0 | 86 | 86 |
| 50 | ATL | 2010 | 84423666.0 | 91 | 91 |
| 51 | ATL | 2011 | 87002692.0 | 89 | 89 |
| 52 | ATL | 2012 | 82829942.0 | 94 | 94 |
| 53 | ATL | 2013 | 87871525.0 | 96 | 96 |
| 54 | ATL | 2014 | 97609000.0 | 79 | 79 |
| 55 | BAL | 1985 | 11560712.0 | 83 | 83 |
| 56 | BAL | 1986 | 13001258.0 | 73 | 73 |
| 57 | BAL | 1987 | 13900273.0 | 67 | 67 |
| 58 | BAL | 1988 | 13532075.0 | 54 | 54 |
| 59 | BAL | 1989 | 8275167.0 | 87 | 87 |
| 60 | BAL | 1990 | 9680084.0 | 76 | 76 |
| 61 | BAL | 1991 | 17519000.0 | 67 | 67 |
| 62 | BAL | 1992 | 23780667.0 | 89 | 89 |
| 63 | BAL | 1993 | 29096500.0 | 85 | 85 |
| 64 | BAL | 1994 | 38849769.0 | 63 | 63 |
| 65 | BAL | 1995 | 43942521.0 | 71 | 71 |
| 66 | BAL | 1996 | 54490315.0 | 88 | 88 |
| 67 | BAL | 1997 | 58516400.0 | 98 | 98 |
| 68 | BAL | 1998 | 72355634.0 | 79 | 79 |
| 69 | BAL | 1999 | 80605863.0 | 78 | 78 |
| 70 | BAL | 2000 | 81447435.0 | 74 | 74 |
| 71 | BAL | 2001 | 67599540.0 | 63 | 63 |
| 72 | BAL | 2002 | 60493487.0 | 67 | 67 |
| 73 | BAL | 2003 | 73877500.0 | 71 | 71 |
| 74 | BAL | 2004 | 51623333.0 | 78 | 78 |

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|---|---|---|---|---|---|
| 75 | BAL | 2005 | 73914333.0 | 74 | 74 |
| 76 | BAL | 2006 | 72585582.0 | 70 | 70 |
| 77 | BAL | 2007 | 93174808.0 | 69 | 69 |
| 78 | BAL | 2008 | 67196246.0 | 68 | 68 |
| 79 | BAL | 2009 | 67101666.0 | 64 | 64 |
| 80 | BAL | 2010 | 81612500.0 | 66 | 66 |
| 81 | BAL | 2011 | 85304038.0 | 69 | 69 |
| 82 | BAL | 2012 | 77353999.0 | 93 | 93 |
| 83 | BAL | 2013 | 84393333.0 | 85 | 85 |
| 84 | BAL | 2014 | 103416000.0 | 96 | 96 |
| 85 | BOS | 1985 | 10897560.0 | 81 | 81 |
| 86 | BOS | 1986 | 14402239.0 | 95 | 95 |
| 87 | BOS | 1987 | 10144167.0 | 78 | 78 |
| 88 | BOS | 1988 | 13896092.0 | 89 | 89 |
| 89 | BOS | 1989 | 17481748.0 | 83 | 83 |
| 90 | BOS | 1990 | 20558333.0 | 88 | 88 |
| 91 | BOS | 1991 | 35167500.0 | 84 | 84 |
| 92 | BOS | 1992 | 43610584.0 | 73 | 73 |
| 93 | BOS | 1993 | 37120583.0 | 80 | 80 |
| 94 | BOS | 1994 | 37859084.0 | 54 | 54 |
| 95 | BOS | 1995 | 32455518.0 | 86 | 86 |
| 96 | BOS | 1996 | 42393500.0 | 85 | 85 |
| 97 | BOS | 1997 | 43558750.0 | 78 | 78 |
| 98 | BOS | 1998 | 56757000.0 | 92 | 92 |
| 99 | BOS | 1999 | 63497500.0 | 94 | 94 |
| 100 | BOS | 2000 | 77940333.0 | 85 | 85 |
| 101 | BOS | 2001 | 110035833.0 | 82 | 82 |
| 102 | BOS | 2002 | 108366060.0 | 93 | 93 |
| 103 | BOS | 2003 | 99946500.0 | 95 | 95 |
| 104 | BOS | 2004 | 127298500.0 | 98 | 98 |
| 105 | BOS | 2005 | 123505125.0 | 95 | 95 |
| 106 | BOS | 2006 | 120099824.0 | 86 | 86 |
| 107 | BOS | 2007 | 143026214.0 | 96 | 96 |
| 108 | BOS | 2008 | 133390035.0 | 95 | 95 |
| 109 | BOS | 2009 | 121345999.0 | 95 | 95 |
| 110 | BOS | 2010 | 162447333.0 | 89 | 89 |
| 111 | BOS | 2011 | 161762475.0 | 90 | 90 |
| 112 | BOS | 2012 | 173186617.0 | 69 | 69 |
| 113 | BOS | 2013 | 151530000.0 | 97 | 97 |
| 114 | BOS | 2014 | 139019929.0 | 71 | 71 |
| 115 | CAL | 1985 | 14427894.0 | 90 | 90 |
| 116 | CAL | 1986 | 14427258.0 | 92 | 92 |
| 117 | CAL | 1987 | 12843499.0 | 75 | 75 |
| 118 | CAL | 1988 | 11947388.0 | 75 | 75 |
| 119 | CAL | 1989 | 15097833.0 | 91 | 91 |
| 120 | CAL | 1990 | 21720000.0 | 80 | 80 |
| 121 | CAL | 1991 | 33060001.0 | 81 | 81 |
| 122 | CAL | 1992 | 34749334.0 | 72 | 72 |
| 123 | CAL | 1993 | 28588334.0 | 71 | 71 |
| 124 | CAL | 1994 | 25156218.0 | 47 | 47 |

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|---|---|---|---|---|---|
| 125 | CAL | 1995 | 31223171.0 | 78 | 78 |
| 126 | CAL | 1996 | 28738000.0 | 70 | 70 |
| 127 | CHA | 1985 | 9846178.0 | 85 | 85 |
| 128 | CHA | 1986 | 10418819.0 | 72 | 72 |
| 129 | CHA | 1987 | 10641843.0 | 77 | 77 |
| 130 | CHA | 1988 | 6390000.0 | 71 | 71 |
| 131 | CHA | 1989 | 7265410.0 | 69 | 69 |
| 132 | CHA | 1990 | 9491500.0 | 94 | 94 |
| 133 | CHA | 1991 | 16919667.0 | 87 | 87 |
| 134 | CHA | 1992 | 30160833.0 | 86 | 86 |
| 135 | CHA | 1993 | 39696166.0 | 94 | 94 |
| 136 | CHA | 1994 | 39183836.0 | 67 | 67 |
| 137 | CHA | 1995 | 46961282.0 | 68 | 68 |
| 138 | CHA | 1996 | 45139500.0 | 85 | 85 |
| 139 | CHA | 1997 | 57740000.0 | 80 | 80 |
| 140 | CHA | 1998 | 38335000.0 | 80 | 80 |
| 141 | CHA | 1999 | 25620000.0 | 75 | 75 |
| 142 | CHA | 2000 | 31133500.0 | 95 | 95 |
| 143 | CHA | 2001 | 65653667.0 | 83 | 83 |
| 144 | CHA | 2002 | 57052833.0 | 81 | 81 |
| 145 | CHA | 2003 | 51010000.0 | 86 | 86 |
| 146 | CHA | 2004 | 65212500.0 | 83 | 83 |
| 147 | CHA | 2005 | 75178000.0 | 99 | 99 |
| 148 | CHA | 2006 | 102750667.0 | 90 | 90 |
| 149 | CHA | 2007 | 108671833.0 | 72 | 72 |
| 150 | CHA | 2008 | 121189332.0 | 89 | 89 |
| 151 | CHA | 2009 | 96068500.0 | 79 | 79 |
| 152 | CHA | 2010 | 105530000.0 | 88 | 88 |
| 153 | CHA | 2011 | 127789000.0 | 79 | 79 |
| 154 | CHA | 2012 | 96919500.0 | 85 | 85 |
| 155 | CHA | 2013 | 120065277.0 | 63 | 63 |
| 156 | CHA | 2014 | 81830500.0 | 73 | 73 |
| 157 | CHN | 1985 | 12702917.0 | 77 | 77 |
| 158 | CHN | 1986 | 17208165.0 | 70 | 70 |
| 159 | CHN | 1987 | 14307999.0 | 76 | 76 |
| 160 | CHN | 1988 | 13119198.0 | 77 | 77 |
| 161 | CHN | 1989 | 10668000.0 | 93 | 93 |
| 162 | CHN | 1990 | 13624000.0 | 77 | 77 |
| 163 | CHN | 1991 | 23175667.0 | 77 | 77 |
| 164 | CHN | 1992 | 29829686.0 | 78 | 78 |
| 165 | CHN | 1993 | 39386666.0 | 84 | 84 |
| 166 | CHN | 1994 | 36287333.0 | 49 | 49 |
| 167 | CHN | 1995 | 29505834.0 | 73 | 73 |
| 168 | CHN | 1996 | 33081000.0 | 76 | 76 |
| 169 | CHN | 1997 | 42155333.0 | 68 | 68 |
| 170 | CHN | 1998 | 50838000.0 | 90 | 90 |
| 171 | CHN | 1999 | 62343000.0 | 67 | 67 |
| 172 | CHN | 2000 | 60539333.0 | 65 | 65 |
| 173 | CHN | 2001 | 64715833.0 | 88 | 88 |
| 174 | CHN | 2002 | 75690833.0 | 67 | 67 |

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|---|---|---|---|---|---|
| 175 | CHN | 2003 | 79868333.0 | 88 | 88 |
| 176 | CHN | 2004 | 90560000.0 | 89 | 89 |
| 177 | CHN | 2005 | 87032933.0 | 79 | 79 |
| 178 | CHN | 2006 | 94424499.0 | 66 | 66 |
| 179 | CHN | 2007 | 99670332.0 | 85 | 85 |
| 180 | CHN | 2008 | 118345833.0 | 97 | 97 |
| 181 | CHN | 2009 | 134809000.0 | 83 | 83 |
| 182 | CHN | 2010 | 146609000.0 | 75 | 75 |
| 183 | CHN | 2011 | 125047329.0 | 71 | 71 |
| 184 | CHN | 2012 | 88197033.0 | 61 | 61 |
| 185 | CHN | 2013 | 100567726.0 | 66 | 66 |
| 186 | CHN | 2014 | 65522500.0 | 73 | 73 |
| 187 | CIN | 1985 | 8359917.0 | 89 | 89 |
| 188 | CIN | 1986 | 11906388.0 | 86 | 86 |
| 189 | CIN | 1987 | 9281500.0 | 84 | 84 |
| 190 | CIN | 1988 | 8888409.0 | 87 | 87 |
| 191 | CIN | 1989 | 11072000.0 | 75 | 75 |
| 192 | CIN | 1990 | 14370000.0 | 91 | 91 |
| 193 | CIN | 1991 | 26305333.0 | 74 | 74 |
| 194 | CIN | 1992 | 35931499.0 | 90 | 90 |
| 195 | CIN | 1993 | 44879666.0 | 73 | 73 |
| 196 | CIN | 1994 | 40961833.0 | 66 | 66 |
| 197 | CIN | 1995 | 43144670.0 | 85 | 85 |
| 198 | CIN | 1996 | 42526334.0 | 81 | 81 |
| 199 | CIN | 1997 | 49768000.0 | 76 | 76 |
| 200 | CIN | 1998 | 23005000.0 | 77 | 77 |
| 201 | CIN | 1999 | 33962761.0 | 96 | 96 |
| 202 | CIN | 2000 | 46867200.0 | 85 | 85 |
| 203 | CIN | 2001 | 48986000.0 | 66 | 66 |
| 204 | CIN | 2002 | 45050390.0 | 78 | 78 |
| 205 | CIN | 2003 | 59355667.0 | 69 | 69 |
| 206 | CIN | 2004 | 46615250.0 | 76 | 76 |
| 207 | CIN | 2005 | 61892583.0 | 73 | 73 |
| 208 | CIN | 2006 | 60909519.0 | 80 | 80 |
| 209 | CIN | 2007 | 68524980.0 | 72 | 72 |
| 210 | CIN | 2008 | 74117695.0 | 74 | 74 |
| 211 | CIN | 2009 | 73558500.0 | 78 | 78 |
| 212 | CIN | 2010 | 71761542.0 | 91 | 91 |
| 213 | CIN | 2011 | 75947134.0 | 79 | 79 |
| 214 | CIN | 2012 | 82203616.0 | 97 | 97 |
| 215 | CIN | 2013 | 106404462.0 | 90 | 90 |
| 216 | CIN | 2014 | 108217500.0 | 76 | 76 |
| 217 | CLE | 1985 | 6551666.0 | 60 | 60 |
| 218 | CLE | 1986 | 7809500.0 | 84 | 84 |
| 219 | CLE | 1987 | 8513750.0 | 61 | 61 |
| 220 | CLE | 1988 | 8936500.0 | 78 | 78 |
| 221 | CLE | 1989 | 9094500.0 | 73 | 73 |
| 222 | CLE | 1990 | 14487000.0 | 77 | 77 |
| 223 | CLE | 1991 | 17635000.0 | 57 | 57 |
| 224 | CLE | 1992 | 9373044.0 | 76 | 76 |

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|---|---|---|---|---|---|
| 225 | CLE | 1993 | 18561000.0 | 76 | 76 |
| 226 | CLE | 1994 | 30490500.0 | 66 | 66 |
| 227 | CLE | 1995 | 37937835.0 | 100 | 100 |
| 228 | CLE | 1996 | 48107360.0 | 99 | 99 |
| 229 | CLE | 1997 | 56802460.0 | 86 | 86 |
| 230 | CLE | 1998 | 60800166.0 | 89 | 89 |
| 231 | CLE | 1999 | 72978462.0 | 97 | 97 |
| 232 | CLE | 2000 | 75880771.0 | 90 | 90 |
| 233 | CLE | 2001 | 93152001.0 | 91 | 91 |
| 234 | CLE | 2002 | 78909449.0 | 74 | 74 |
| 235 | CLE | 2003 | 48584834.0 | 68 | 68 |
| 236 | CLE | 2004 | 34319300.0 | 80 | 80 |
| 237 | CLE | 2005 | 41502500.0 | 93 | 93 |
| 238 | CLE | 2006 | 56031500.0 | 78 | 78 |
| 239 | CLE | 2007 | 61673267.0 | 96 | 96 |
| 240 | CLE | 2008 | 78970066.0 | 81 | 81 |
| 241 | CLE | 2009 | 81579166.0 | 65 | 65 |
| 242 | CLE | 2010 | 61203966.0 | 69 | 69 |
| 243 | CLE | 2011 | 48776566.0 | 80 | 80 |
| 244 | CLE | 2012 | 78430300.0 | 68 | 68 |
| 245 | CLE | 2013 | 75771800.0 | 92 | 92 |
| 246 | CLE | 2014 | 82151899.0 | 85 | 85 |
| 247 | COL | 1993 | 10353500.0 | 67 | 67 |
| 248 | COL | 1994 | 23887333.0 | 53 | 53 |
| 249 | COL | 1995 | 34154717.0 | 77 | 77 |
| 250 | COL | 1996 | 40179823.0 | 83 | 83 |
| 251 | COL | 1997 | 43559667.0 | 83 | 83 |
| 252 | COL | 1998 | 50484648.0 | 77 | 77 |
| 253 | COL | 1999 | 61935837.0 | 72 | 72 |
| 254 | COL | 2000 | 61111190.0 | 82 | 82 |
| 255 | COL | 2001 | 71541334.0 | 73 | 73 |
| 256 | COL | 2002 | 56851043.0 | 73 | 73 |
| 257 | COL | 2003 | 67179667.0 | 74 | 74 |
| 258 | COL | 2004 | 65445167.0 | 68 | 68 |
| 259 | COL | 2005 | 47839000.0 | 67 | 67 |
| 260 | COL | 2006 | 41233000.0 | 76 | 76 |
| 261 | COL | 2007 | 54041000.0 | 90 | 90 |
| 262 | COL | 2008 | 68655500.0 | 74 | 74 |
| 263 | COL | 2009 | 75201000.0 | 92 | 92 |
| 264 | COL | 2010 | 84227000.0 | 83 | 83 |
| 265 | COL | 2011 | 88148071.0 | 73 | 73 |
| 266 | COL | 2012 | 78069571.0 | 64 | 64 |
| 267 | COL | 2013 | 74409071.0 | 74 | 74 |
| 268 | COL | 2014 | 95403500.0 | 66 | 66 |
| 269 | DET | 1985 | 10348143.0 | 84 | 84 |
| 270 | DET | 1986 | 12335714.0 | 87 | 87 |
| 271 | DET | 1987 | 12122881.0 | 98 | 98 |
| 272 | DET | 1988 | 12869571.0 | 88 | 88 |
| 273 | DET | 1989 | 15146404.0 | 59 | 59 |
| 274 | DET | 1990 | 17593238.0 | 79 | 79 |

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|---|---|---|---|---|---|
| 275 | DET | 1991 | 23838333.0 | 84 | 84 |
| 276 | DET | 1992 | 27322834.0 | 75 | 75 |
| 277 | DET | 1993 | 38150165.0 | 85 | 85 |
| 278 | DET | 1994 | 41446501.0 | 53 | 53 |
| 279 | DET | 1995 | 37044168.0 | 60 | 60 |
| 280 | DET | 1996 | 23438000.0 | 53 | 53 |
| 281 | DET | 1997 | 17272000.0 | 79 | 79 |
| 282 | DET | 1998 | 24065000.0 | 65 | 65 |
| 283 | DET | 1999 | 36489666.0 | 69 | 69 |
| 284 | DET | 2000 | 58265167.0 | 79 | 79 |
| 285 | DET | 2001 | 53416167.0 | 66 | 66 |
| 286 | DET | 2002 | 55048000.0 | 55 | 55 |
| 287 | DET | 2003 | 49168000.0 | 43 | 43 |
| 288 | DET | 2004 | 46832000.0 | 72 | 72 |
| 289 | DET | 2005 | 69092000.0 | 71 | 71 |
| 290 | DET | 2006 | 82612866.0 | 95 | 95 |
| 291 | DET | 2007 | 94800369.0 | 88 | 88 |
| 292 | DET | 2008 | 137685196.0 | 74 | 74 |
| 293 | DET | 2009 | 115085145.0 | 86 | 86 |
| 294 | DET | 2010 | 122864928.0 | 81 | 81 |
| 295 | DET | 2011 | 105700231.0 | 95 | 95 |
| 296 | DET | 2012 | 132300000.0 | 88 | 88 |
| 297 | DET | 2013 | 145989500.0 | 93 | 93 |
| 298 | DET | 2014 | 152855500.0 | 90 | 90 |
| 299 | FLO | 1993 | 19330545.0 | 64 | 64 |
| 300 | FLO | 1994 | 21633000.0 | 51 | 51 |
| 301 | FLO | 1995 | 24515781.0 | 67 | 67 |
| 302 | FLO | 1996 | 31022500.0 | 80 | 80 |
| 303 | FLO | 1997 | 48692500.0 | 92 | 92 |
| 304 | FLO | 1998 | 41322667.0 | 54 | 54 |
| 305 | FLO | 1999 | 21085000.0 | 64 | 64 |
| 306 | FLO | 2000 | 19872000.0 | 79 | 79 |
| 307 | FLO | 2001 | 35762500.0 | 76 | 76 |
| 308 | FLO | 2002 | 41979917.0 | 79 | 79 |
| 309 | FLO | 2003 | 49450000.0 | 91 | 91 |
| 310 | FLO | 2004 | 42143042.0 | 83 | 83 |
| 311 | FLO | 2005 | 60408834.0 | 83 | 83 |
| 312 | FLO | 2006 | 14671500.0 | 78 | 78 |
| 313 | FLO | 2007 | 30507000.0 | 71 | 71 |
| 314 | FLO | 2008 | 21811500.0 | 84 | 84 |
| 315 | FLO | 2009 | 36834000.0 | 87 | 87 |
| 316 | FLO | 2010 | 57029719.0 | 80 | 80 |
| 317 | FLO | 2011 | 56944000.0 | 72 | 72 |
| 318 | HOU | 1985 | 9993051.0 | 83 | 83 |
| 319 | HOU | 1986 | 9873276.0 | 96 | 96 |
| 320 | HOU | 1987 | 12608371.0 | 76 | 76 |
| 321 | HOU | 1988 | 12286167.0 | 82 | 82 |
| 322 | HOU | 1989 | 15029500.0 | 86 | 86 |
| 323 | HOU | 1990 | 18330000.0 | 75 | 75 |
| 324 | HOU | 1991 | 12852500.0 | 65 | 65 |

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|---|---|---|---|---|---|
| 325 | HOU | 1992 | 15407500.0 | 81 | 81 |
| 326 | HOU | 1993 | 30210500.0 | 85 | 85 |
| 327 | HOU | 1994 | 33126000.0 | 66 | 66 |
| 328 | HOU | 1995 | 34169834.0 | 76 | 76 |
| 329 | HOU | 1996 | 28487000.0 | 82 | 82 |
| 330 | HOU | 1997 | 34777500.0 | 84 | 84 |
| 331 | HOU | 1998 | 42374000.0 | 102 | 102 |
| 332 | HOU | 1999 | 54914000.0 | 97 | 97 |
| 333 | HOU | 2000 | 51289111.0 | 72 | 72 |
| 334 | HOU | 2001 | 60612667.0 | 93 | 93 |
| 335 | HOU | 2002 | 63448417.0 | 84 | 84 |
| 336 | HOU | 2003 | 71040000.0 | 87 | 87 |
| 337 | HOU | 2004 | 75397000.0 | 92 | 92 |
| 338 | HOU | 2005 | 76779000.0 | 89 | 89 |
| 339 | HOU | 2006 | 88694435.0 | 82 | 82 |
| 340 | HOU | 2007 | 87759000.0 | 73 | 73 |
| 341 | HOU | 2008 | 88930414.0 | 86 | 86 |
| 342 | HOU | 2009 | 102996414.0 | 74 | 74 |
| 343 | HOU | 2010 | 92355500.0 | 76 | 76 |
| 344 | HOU | 2011 | 70694000.0 | 56 | 56 |
| 345 | HOU | 2012 | 60651000.0 | 55 | 55 |
| 346 | HOU | 2013 | 17890700.0 | 51 | 51 |
| 347 | HOU | 2014 | 35116300.0 | 70 | 70 |
| 348 | KCA | 1985 | 9321179.0 | 91 | 91 |
| 349 | KCA | 1986 | 13043698.0 | 76 | 76 |
| 350 | KCA | 1987 | 11828056.0 | 83 | 83 |
| 351 | KCA | 1988 | 14556562.0 | 84 | 84 |
| 352 | KCA | 1989 | 18683568.0 | 92 | 92 |
| 353 | KCA | 1990 | 23361084.0 | 75 | 75 |
| 354 | KCA | 1991 | 26319834.0 | 82 | 82 |
| 355 | KCA | 1992 | 33893834.0 | 72 | 72 |
| 356 | KCA | 1993 | 41346167.0 | 84 | 84 |
| 357 | KCA | 1994 | 40541334.0 | 64 | 64 |
| 358 | KCA | 1995 | 29532834.0 | 70 | 70 |
| 359 | KCA | 1996 | 20281250.0 | 75 | 75 |
| 360 | KCA | 1997 | 34655000.0 | 67 | 67 |
| 361 | KCA | 1998 | 36862500.0 | 72 | 72 |
| 362 | KCA | 1999 | 26225000.0 | 64 | 64 |
| 363 | KCA | 2000 | 23433000.0 | 77 | 77 |
| 364 | KCA | 2001 | 35422500.0 | 65 | 65 |
| 365 | KCA | 2002 | 47257000.0 | 62 | 62 |
| 366 | KCA | 2003 | 40518000.0 | 83 | 83 |
| 367 | KCA | 2004 | 47609000.0 | 58 | 58 |
| 368 | KCA | 2005 | 36881000.0 | 56 | 56 |
| 369 | KCA | 2006 | 47294000.0 | 62 | 62 |
| 370 | KCA | 2007 | 67116500.0 | 69 | 69 |
| 371 | KCA | 2008 | 58245500.0 | 75 | 75 |
| 372 | KCA | 2009 | 70519333.0 | 65 | 65 |
| 373 | KCA | 2010 | 71405210.0 | 67 | 67 |
| 374 | KCA | 2011 | 35712000.0 | 71 | 71 |

| | | | | | |
|---|---|---|---|---|---|
| 375 | KCA | 2012 | 60916225.0 | 72 | 72 |
| 376 | KCA | 2013 | 80091725.0 | 86 | 86 |
| 377 | KCA | 2014 | 74594075.0 | 89 | 89 |
| 378 | LAA | 2005 | 94867822.0 | 95 | 95 |
| 379 | LAA | 2006 | 103472000.0 | 89 | 89 |
| 380 | LAA | 2007 | 109251333.0 | 94 | 94 |
| 381 | LAA | 2008 | 119216333.0 | 100 | 100 |
| 382 | LAA | 2009 | 113709000.0 | 97 | 97 |
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| 392 | LAN | 1989 | 21071562.0 | 77 | 77 |
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| 771 | TBA | 1998 | 27280000.0 | 63 | 63 |
| 772 | TBA | 1999 | 38870000.0 | 69 | 69 |
| 773 | TBA | 2000 | 62765129.0 | 69 | 69 |
| 774 | TBA | 2001 | 56980000.0 | 62 | 62 |

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| 775 | TBA | 2002 | 34380000.0 | 55 | 55 |
| 776 | TBA | 2003 | 19630000.0 | 63 | 63 |
| 777 | TBA | 2004 | 29556667.0 | 70 | 70 |
| 778 | TBA | 2005 | 29679067.0 | 67 | 67 |
| 779 | TBA | 2006 | 34917967.0 | 61 | 61 |
| 780 | TBA | 2007 | 24123500.0 | 66 | 66 |
| 781 | TBA | 2008 | 43820597.0 | 97 | 97 |
| 782 | TBA | 2009 | 63313034.0 | 84 | 84 |
| 783 | TBA | 2010 | 71923471.0 | 96 | 96 |
| 784 | TBA | 2011 | 41053571.0 | 91 | 91 |
| 785 | TBA | 2012 | 64173500.0 | 90 | 90 |
| 786 | TBA | 2013 | 52955272.0 | 92 | 92 |
| 787 | TBA | 2014 | 72689100.0 | 77 | 77 |
| 788 | TEX | 1985 | 7676500.0 | 62 | 62 |
| 789 | TEX | 1986 | 6743119.0 | 87 | 87 |
| 790 | TEX | 1987 | 880000.0 | 75 | 75 |
| 791 | TEX | 1988 | 5342131.0 | 70 | 70 |
| 792 | TEX | 1989 | 11893781.0 | 83 | 83 |
| 793 | TEX | 1990 | 14874372.0 | 83 | 83 |
| 794 | TEX | 1991 | 18224500.0 | 85 | 85 |
| 795 | TEX | 1992 | 30128167.0 | 77 | 77 |
| 796 | TEX | 1993 | 36376959.0 | 86 | 86 |
| 797 | TEX | 1994 | 32973597.0 | 52 | 52 |
| 798 | TEX | 1995 | 34581451.0 | 74 | 74 |
| 799 | TEX | 1996 | 39041528.0 | 90 | 90 |
| 800 | TEX | 1997 | 53448838.0 | 77 | 77 |
| 801 | TEX | 1998 | 56572095.0 | 88 | 88 |
| 802 | TEX | 1999 | 76709931.0 | 95 | 95 |
| 803 | TEX | 2000 | 70795921.0 | 71 | 71 |
| 804 | TEX | 2001 | 88633500.0 | 73 | 73 |
| 805 | TEX | 2002 | 105526122.0 | 72 | 72 |
| 806 | TEX | 2003 | 103491667.0 | 71 | 71 |
| 807 | TEX | 2004 | 55050417.0 | 89 | 89 |
| 808 | TEX | 2005 | 55849000.0 | 79 | 79 |
| 809 | TEX | 2006 | 68228662.0 | 80 | 80 |
| 810 | TEX | 2007 | 68318675.0 | 75 | 75 |
| 811 | TEX | 2008 | 67712326.0 | 79 | 79 |
| 812 | TEX | 2009 | 68178798.0 | 87 | 87 |
| 813 | TEX | 2010 | 55250544.0 | 90 | 90 |
| 814 | TEX | 2011 | 92299264.0 | 96 | 96 |
| 815 | TEX | 2012 | 120510974.0 | 93 | 93 |
| 816 | TEX | 2013 | 112522600.0 | 91 | 91 |
| 817 | TEX | 2014 | 112255059.0 | 67 | 67 |
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| 819 | TOR | 1986 | 12611047.0 | 86 | 86 |
| 820 | TOR | 1987 | 10479501.0 | 96 | 96 |
| 821 | TOR | 1988 | 12241225.0 | 87 | 87 |
| 822 | TOR | 1989 | 16261666.0 | 89 | 89 |
| 823 | TOR | 1990 | 17756834.0 | 86 | 86 |
| 824 | TOR | 1991 | 19902417.0 | 91 | 91 |

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| 826 | TOR | 1993 | 47279166.0 | 95 | 95 |
| 827 | TOR | 1994 | 43433668.0 | 55 | 55 |
| 828 | TOR | 1995 | 50590000.0 | 56 | 56 |
| 829 | TOR | 1996 | 29555083.0 | 74 | 74 |
| 830 | TOR | 1997 | 47079833.0 | 76 | 76 |
| 831 | TOR | 1998 | 51376000.0 | 88 | 88 |
| 832 | TOR | 1999 | 45444333.0 | 84 | 84 |
| 833 | TOR | 2000 | 44838332.0 | 83 | 83 |
| 834 | TOR | 2001 | 76895999.0 | 80 | 80 |
| 835 | TOR | 2002 | 76864333.0 | 78 | 78 |
| 836 | TOR | 2003 | 51269000.0 | 86 | 86 |
| 837 | TOR | 2004 | 50017000.0 | 67 | 67 |
| 838 | TOR | 2005 | 45719500.0 | 80 | 80 |
| 839 | TOR | 2006 | 71365000.0 | 87 | 87 |
| 840 | TOR | 2007 | 81942800.0 | 83 | 83 |
| 841 | TOR | 2008 | 97793900.0 | 86 | 86 |
| 842 | TOR | 2009 | 80538300.0 | 75 | 75 |
| 843 | TOR | 2010 | 62234000.0 | 85 | 85 |
| 844 | TOR | 2011 | 62567800.0 | 81 | 81 |
| 845 | TOR | 2012 | 75009200.0 | 73 | 73 |
| 846 | TOR | 2013 | 126288100.0 | 74 | 74 |
| 847 | TOR | 2014 | 109920100.0 | 83 | 83 |
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| 849 | WAS | 2006 | 63143000.0 | 71 | 71 |
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| 851 | WAS | 2008 | 54961000.0 | 59 | 59 |
| 852 | WAS | 2009 | 59928000.0 | 59 | 59 |
| 853 | WAS | 2010 | 61400000.0 | 69 | 69 |
| 854 | WAS | 2011 | 63856928.0 | 80 | 80 |
| 855 | WAS | 2012 | 80855143.0 | 98 | 98 |
| 856 | WAS | 2013 | 113703270.0 | 86 | 86 |
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| 2 | 43.209877 |
| 3 | 50.617284 |
| 4 | 46.296296 |
| 5 | 61.111111 |
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| 7 | 56.790123 |
| 8 | 40.123457 |
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| 10 | 52.469136 |
| 11 | 56.790123 |
| 12 | 60.493827 |
| 13 | 51.851852 |
| 14 | 31.481481 |

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| 18 | 50.617284 |
| 19 | 43.209877 |
| 20 | 40.123457 |
| 21 | 58.024691 |
| 22 | 50.000000 |
| 23 | 50.000000 |
| 24 | 39.506173 |
| 25 | 40.740741 |
| 26 | 44.720497 |
| 27 | 42.857143 |
| 28 | 33.750000 |
| 29 | 39.130435 |
| 30 | 40.123457 |
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| 33 | 64.197531 |
| 34 | 59.649123 |
| 35 | 62.500000 |
| 36 | 59.259259 |
| 37 | 62.345679 |
| 38 | 65.432099 |
| 39 | 63.580247 |
| 40 | 58.641975 |
| 41 | 54.320988 |
| 42 | 62.732919 |
| 43 | 62.345679 |
| 44 | 59.259259 |
| 45 | 55.555556 |
| 46 | 48.765432 |
| 47 | 51.851852 |
| 48 | 44.444444 |
| 49 | 53.086420 |
| 50 | 56.172840 |
| 51 | 54.938272 |
| 52 | 58.024691 |
| 53 | 59.259259 |
| 54 | 48.765432 |
| 55 | 51.552795 |
| 56 | 45.061728 |
| 57 | 41.358025 |
| 58 | 33.540373 |
| 59 | 53.703704 |
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| 61 | 41.358025 |
| 62 | 54.938272 |
| 63 | 52.469136 |
| 64 | 56.250000 |

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| 65 | 49.305556 |
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| 67 | 60.493827 |
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| 72 | 41.358025 |
| 73 | 43.558282 |
| 74 | 48.148148 |
| 75 | 45.679012 |
| 76 | 43.209877 |
| 77 | 42.592593 |
| 78 | 42.236025 |
| 79 | 39.506173 |
| 80 | 40.740741 |
| 81 | 42.592593 |
| 82 | 57.407407 |
| 83 | 52.469136 |
| 84 | 59.259259 |
| 85 | 49.693252 |
| 86 | 59.006211 |
| 87 | 48.148148 |
| 88 | 54.938272 |
| 89 | 51.234568 |
| 90 | 54.320988 |
| 91 | 51.851852 |
| 92 | 45.061728 |
| 93 | 49.382716 |
| 94 | 46.956522 |
| 95 | 59.722222 |
| 96 | 52.469136 |
| 97 | 48.148148 |
| 98 | 56.790123 |
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| 105 | 58.641975 |
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| 107 | 59.259259 |
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| 109 | 58.641975 |
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| 112 | 42.592593 |
| 113 | 59.876543 |
| 114 | 43.827160 |

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| 115 | 55.555556 |
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| 118 | 46.296296 |
| 119 | 56.172840 |
| 120 | 49.382716 |
| 121 | 50.000000 |
| 122 | 44.444444 |
| 123 | 43.827160 |
| 124 | 40.869565 |
| 125 | 53.793103 |
| 126 | 43.478261 |
| 127 | 52.147239 |
| 128 | 44.444444 |
| 129 | 47.530864 |
| 130 | 44.099379 |
| 131 | 42.857143 |
| 132 | 58.024691 |
| 133 | 53.703704 |
| 134 | 53.086420 |
| 135 | 58.024691 |
| 136 | 59.292035 |
| 137 | 46.896552 |
| 138 | 52.469136 |
| 139 | 49.689441 |
| 140 | 49.079755 |
| 141 | 46.296296 |
| 142 | 58.641975 |
| 143 | 51.234568 |
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| 149 | 44.444444 |
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| 151 | 48.765432 |
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| 154 | 52.469136 |
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| 164 | 48.148148 |

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| 165 | 51.533742 |
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| 168 | 46.913580 |
| 169 | 41.975309 |
| 170 | 55.214724 |
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| 179 | 52.469136 |
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| 182 | 46.296296 |
| 183 | 43.827160 |
| 184 | 37.654321 |
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| 187 | 54.938272 |
| 188 | 53.086420 |
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| 192 | 56.172840 |
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| 194 | 55.555556 |
| 195 | 45.061728 |
| 196 | 57.391304 |
| 197 | 59.027778 |
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| 200 | 47.530864 |
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| 202 | 52.147239 |
| 203 | 40.740741 |
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| 208 | 49.382716 |
| 209 | 44.444444 |
| 210 | 45.679012 |
| 211 | 48.148148 |
| 212 | 56.172840 |
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| 214 | 59.876543 |

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| 217 | 37.037037 |
| 218 | 51.533742 |
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| 229 | 53.416149 |
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| 231 | 59.876543 |
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| 233 | 56.172840 |
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| 235 | 41.975309 |
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| 237 | 57.407407 |
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| 247 | 41.358025 |
| 248 | 45.299145 |
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| 257 | 45.679012 |
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| 259 | 41.358025 |
| 260 | 46.913580 |
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| 265 | 45.061728 |
| 266 | 39.506173 |
| 267 | 45.679012 |
| 268 | 40.740741 |
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| 285 | 40.740741 |
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| 312 | 48.148148 |
| 313 | 43.827160 |
| 314 | 52.173913 |

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| 315 | 53.703704 |
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| 317 | 44.444444 |
| 318 | 51.234568 |
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| 363 | 47.530864 |
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| 556 | 48.765432 |
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| 558 | 45.679012 |
| 559 | 45.679012 |
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| 563 | 50.000000 |
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| 576 | 56.521739 |
| 577 | 62.962963 |
| 578 | 63.580247 |
| 579 | 59.259259 |
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| 581 | 54.320988 |
| 582 | 57.407407 |
| 583 | 46.913580 |
| 584 | 46.583851 |
| 585 | 46.296296 |
| 586 | 50.000000 |
| 587 | 45.679012 |
| 588 | 58.024691 |
| 589 | 59.259259 |
| 590 | 54.320988 |
| 591 | 46.296296 |
| 592 | 53.416149 |
| 593 | 49.382716 |
| 594 | 40.123457 |
| 595 | 41.104294 |
| 596 | 47.530864 |
| 597 | 48.148148 |
| 598 | 43.209877 |
| 599 | 59.876543 |
| 600 | 46.956522 |
| 601 | 47.916667 |
| 602 | 41.358025 |
| 603 | 41.975309 |
| 604 | 46.296296 |
| 605 | 47.530864 |
| 606 | 40.123457 |
| 607 | 53.086420 |
| 608 | 49.689441 |
| 609 | 53.086420 |
| 610 | 53.086420 |
| 611 | 54.320988 |
| 612 | 52.469136 |
| 613 | 54.938272 |
| 614 | 56.790123 |

| | |
|---|---|
| 615 | 57.407407 |
| 616 | 59.876543 |
| 617 | 62.962963 |
| 618 | 50.000000 |
| 619 | 45.061728 |
| 620 | 45.061728 |
| 621 | 35.403727 |
| 622 | 39.506173 |
| 623 | 49.382716 |
| 624 | 53.125000 |
| 625 | 45.121951 |
| 626 | 58.641975 |
| 627 | 60.493827 |
| 628 | 59.259259 |
| 629 | 46.296296 |
| 630 | 46.491228 |
| 631 | 40.277778 |
| 632 | 45.061728 |
| 633 | 48.765432 |
| 634 | 42.331288 |
| 635 | 48.447205 |
| 636 | 42.592593 |
| 637 | 38.271605 |
| 638 | 44.720497 |
| 639 | 46.296296 |
| 640 | 44.720497 |
| 641 | 41.358025 |
| 642 | 41.358025 |
| 643 | 41.975309 |
| 644 | 41.358025 |
| 645 | 38.509317 |
| 646 | 35.185185 |
| 647 | 44.444444 |
| 648 | 48.765432 |
| 649 | 58.024691 |
| 650 | 54.320988 |
| 651 | 51.234568 |
| 652 | 45.679012 |
| 653 | 40.123457 |
| 654 | 51.552795 |
| 655 | 54.938272 |
| 656 | 46.296296 |
| 657 | 51.851852 |
| 658 | 50.617284 |
| 659 | 37.654321 |
| 660 | 40.170940 |
| 661 | 48.611111 |
| 662 | 56.172840 |
| 663 | 46.913580 |
| 664 | 60.493827 |

| | |
|---|---|
| 665 | 45.679012 |
| 666 | 46.913580 |
| 667 | 48.765432 |
| 668 | 40.740741 |
| 669 | 39.506173 |
| 670 | 53.703704 |
| 671 | 50.617284 |
| 672 | 54.320988 |
| 673 | 54.601227 |
| 674 | 38.888889 |
| 675 | 46.296296 |
| 676 | 55.555556 |
| 677 | 43.827160 |
| 678 | 46.913580 |
| 679 | 46.913580 |
| 680 | 47.530864 |
| 681 | 45.679012 |
| 682 | 41.358025 |
| 683 | 48.148148 |
| 684 | 42.236025 |
| 685 | 45.061728 |
| 686 | 47.530864 |
| 687 | 51.234568 |
| 688 | 39.506173 |
| 689 | 50.617284 |
| 690 | 43.750000 |
| 691 | 54.482759 |
| 692 | 52.795031 |
| 693 | 55.555556 |
| 694 | 47.204969 |
| 695 | 48.765432 |
| 696 | 56.172840 |
| 697 | 71.604938 |
| 698 | 57.407407 |
| 699 | 57.407407 |
| 700 | 38.888889 |
| 701 | 42.592593 |
| 702 | 48.148148 |
| 703 | 54.320988 |
| 704 | 37.654321 |
| 705 | 52.469136 |
| 706 | 37.654321 |
| 707 | 41.358025 |
| 708 | 46.296296 |
| 709 | 43.827160 |
| 710 | 53.703704 |
| 711 | 38.271605 |
| 712 | 51.234568 |
| 713 | 55.555556 |
| 714 | 51.234568 |

| | |
|---|---|
| 715 | 56.790123 |
| 716 | 52.469136 |
| 717 | 46.296296 |
| 718 | 44.444444 |
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| 723 | 55.555556 |
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| 727 | 55.555556 |
| 728 | 58.641975 |
| 729 | 62.111801 |
| 730 | 56.172840 |
| 731 | 46.296296 |
| 732 | 47.204969 |
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| 737 | 53.086420 |
| 738 | 58.024691 |
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| 741 | 62.345679 |
| 742 | 49.068323 |
| 743 | 58.641975 |
| 744 | 46.913580 |
| 745 | 52.439024 |
| 746 | 43.209877 |
| 747 | 51.851852 |
| 748 | 51.234568 |
| 749 | 53.703704 |
| 750 | 46.086957 |
| 751 | 43.356643 |
| 752 | 54.320988 |
| 753 | 45.061728 |
| 754 | 50.920245 |
| 755 | 46.583851 |
| 756 | 58.641975 |
| 757 | 57.407407 |
| 758 | 59.876543 |
| 759 | 52.469136 |
| 760 | 64.814815 |
| 761 | 61.728395 |
| 762 | 51.552795 |
| 763 | 48.148148 |
| 764 | 53.086420 |

| | |
|---|---|
| 765 | 56.172840 |
| 766 | 53.086420 |
| 767 | 55.555556 |
| 768 | 54.320988 |
| 769 | 59.876543 |
| 770 | 55.555556 |
| 771 | 38.888889 |
| 772 | 42.592593 |
| 773 | 42.857143 |
| 774 | 38.271605 |
| 775 | 34.161491 |
| 776 | 38.888889 |
| 777 | 43.478261 |
| 778 | 41.358025 |
| 779 | 37.654321 |
| 780 | 40.740741 |
| 781 | 59.876543 |
| 782 | 51.851852 |
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| 784 | 56.172840 |
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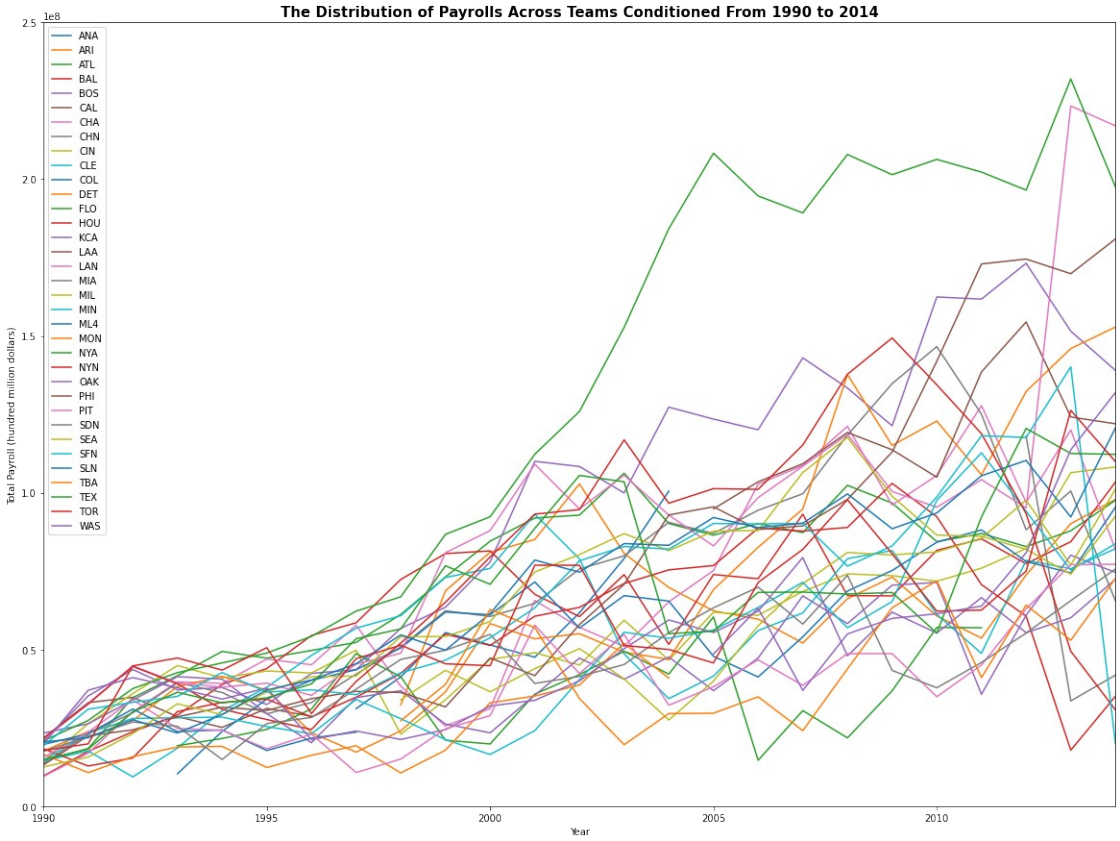
| 786 | 56.441718 |
| 787 | 47.530864 |
| 788 | 38.509317 |
| 789 | 53.703704 |
| 790 | 46.296296 |
| 791 | 43.478261 |
| 792 | 51.234568 |
| 793 | 51.234568 |
| 794 | 52.469136 |
| 795 | 47.530864 |
| 796 | 53.086420 |
| 797 | 45.614035 |
| 798 | 51.388889 |
| 799 | 55.214724 |
| 800 | 47.530864 |
| 801 | 54.320988 |
| 802 | 58.641975 |
| 803 | 43.827160 |
| 804 | 45.061728 |
| 805 | 44.444444 |
| 806 | 43.827160 |
| 807 | 54.938272 |
| 808 | 48.765432 |
| 809 | 49.382716 |
| 810 | 46.296296 |
| 811 | 48.765432 |
| 812 | 53.703704 |
| 813 | 55.555556 |
| 814 | 59.259259 |

```
815       57.407407
816       55.828221
817       41.358025
818       61.490683
819       52.760736
820       59.259259
821       53.703704
822       54.938272
823       53.086420
824       56.172840
825       59.259259
826       58.641975
827       47.826087
828       38.888889
829       45.679012
830       46.913580
831       53.987730
832       51.851852
833       51.234568
834       49.382716
835       48.148148
836       53.086420
837       41.614907
838       49.382716
839       53.703704
840       51.234568
841       53.086420
842       46.296296
843       52.469136
844       50.000000
845       45.061728
846       45.679012
847       51.234568
848       50.000000
849       43.827160
850       45.061728
851       36.645963
852       36.419753
853       42.592593
854       49.689441
855       60.493827
856       53.086420
857       59.259259
```

PROBLEM 2

```
#get the data from 1990 to 2014
new_data = data[(data['yearID'] >= 1990) & (data['yearID'] <= 2014)]
#x-axis and y-axis
plt.figure(figsize = (20, 15))
plt.xlim((1990, 2014))
```

```
plt.ylim((0, 250000000))
plt.title("The Distribution of Payrolls Across Teams Conditioned From
1990 to 2014", size=15, weight = "bold")
plt.xlabel("Year")
plt.ylabel("Total Payroll (hundred million dollars)")
#get the data we want (teamID, yearID and payroll) from the table
teamID_list = new_data['teamID'].to_list()
yearID_list = new_data['yearID'].to_list()
payroll_list = new_data['total_payroll'].to_list()
#convert list to dictionary
def Convert(lst):
    res_dct = {i: lst.count(i) for i in set(lst)}
    return res_dct
#plot
new_teamID_list = Convert(teamID_list)
sorted_teamID_list = sorted(new_teamID_list.keys(), key = lambda x:
x.lower())
for team in sorted_teamID_list:
    index = new_teamID_list[team]
    pay = payroll_list[0:index]
    year = yearID_list[0:index]
    plt.plot(year, pay, label = str(team))
    payroll_list = payroll_list[index:]
    yearID_list = yearID_list[index:]
plt.legend()
plt.show()
```

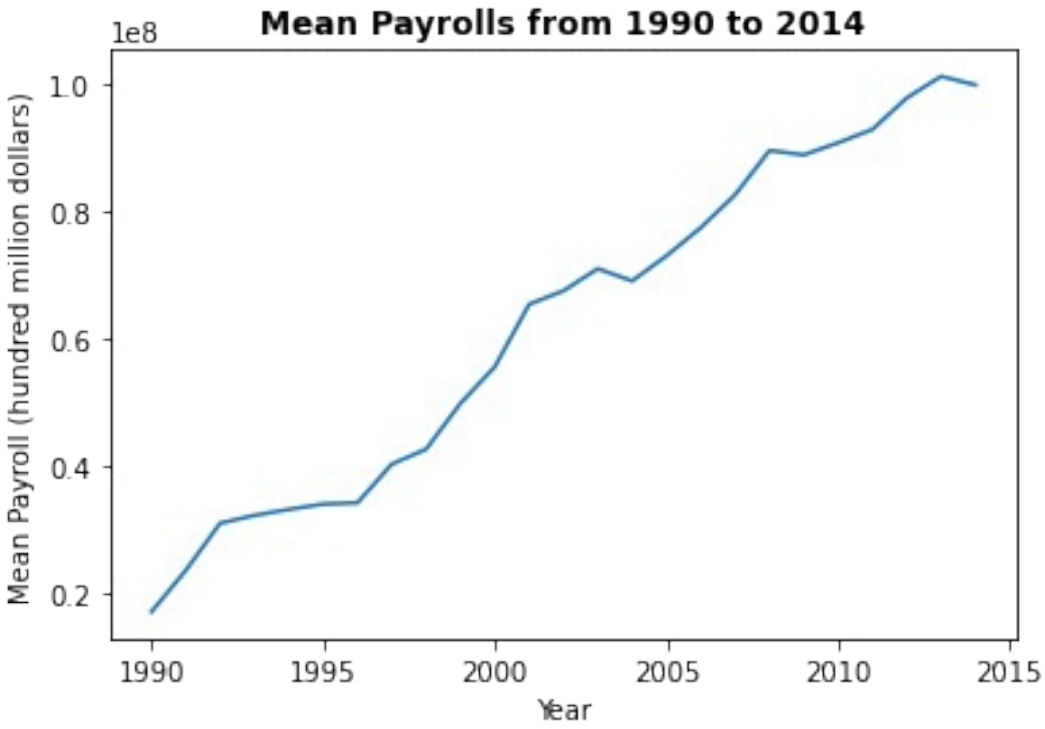



QUETSION 1

The general trend of payroll is increasing from 1990 to 2014 for all teams, and the payroll gap between different teams becomes bigger.

PROBLEM 3

```
#calculate the mean payroll
mean_table = new_data[['yearID','total_payroll']]
mean_payroll = (mean_table.groupby('yearID')).mean()
#plot
plt.title("Mean Payrolls from 1990 to 2014", weight = "bold")
plt.xlabel("Year")
plt.ylabel("Mean Payroll (hundred million dollars)")
plt.plot(mean_payroll)
plt.show()
```

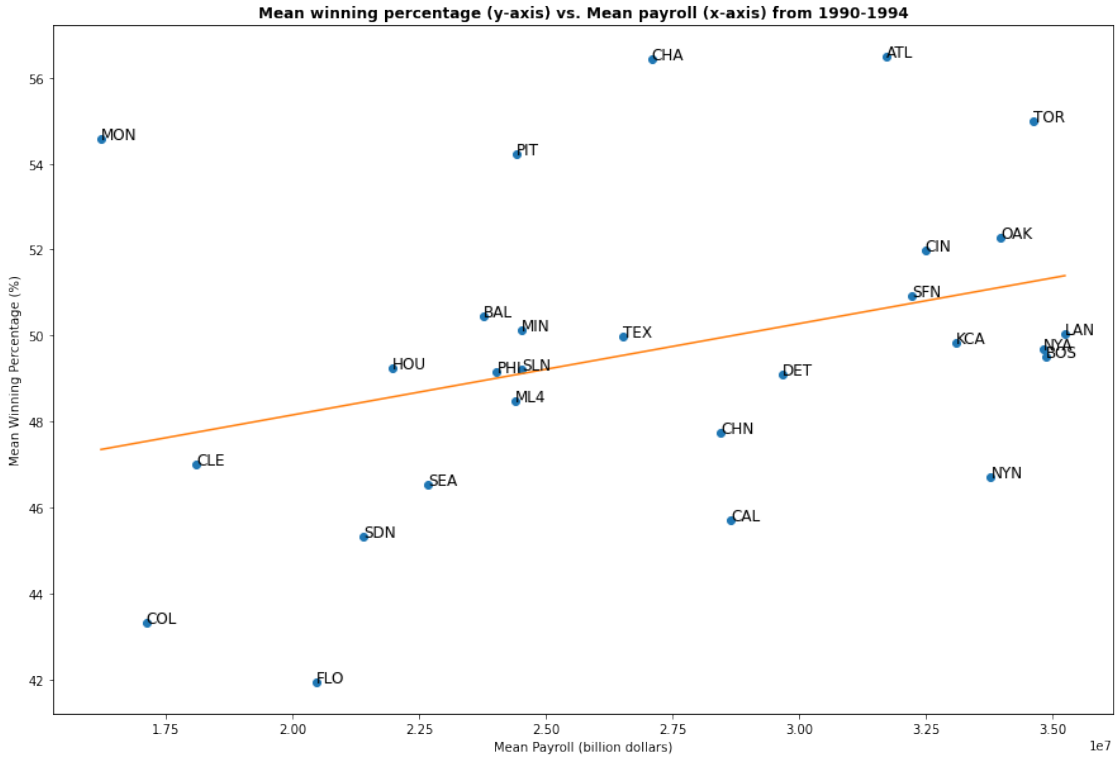


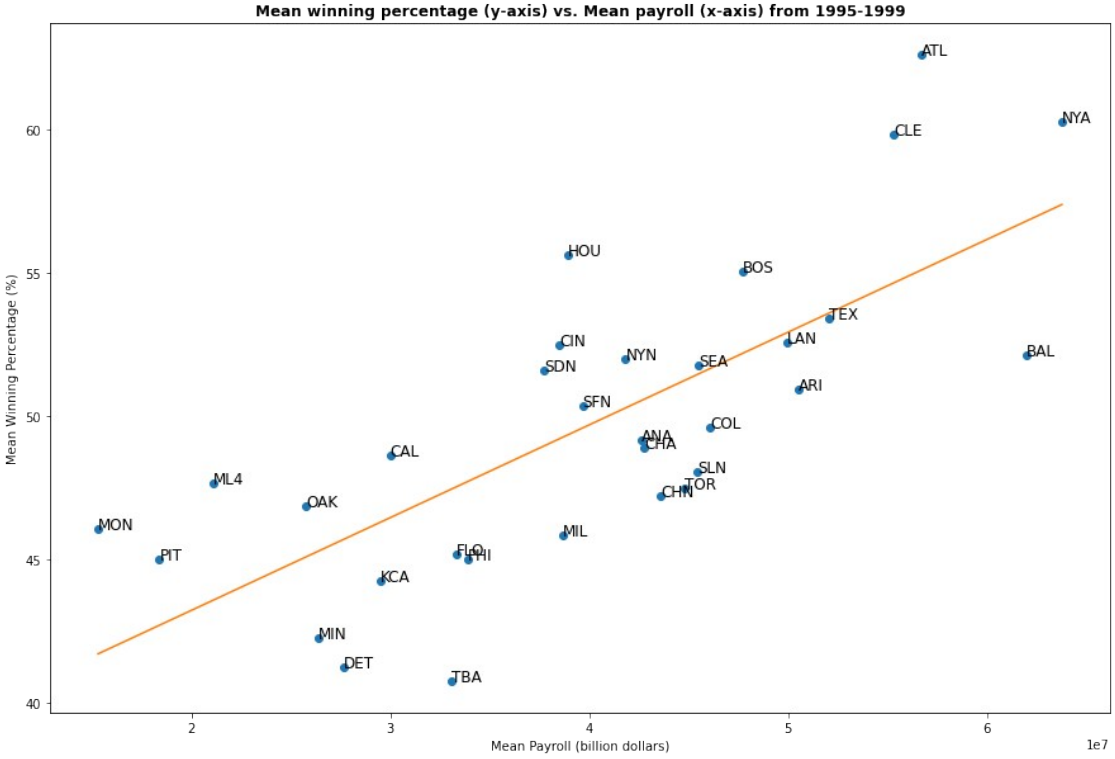

RPOBLEM 4

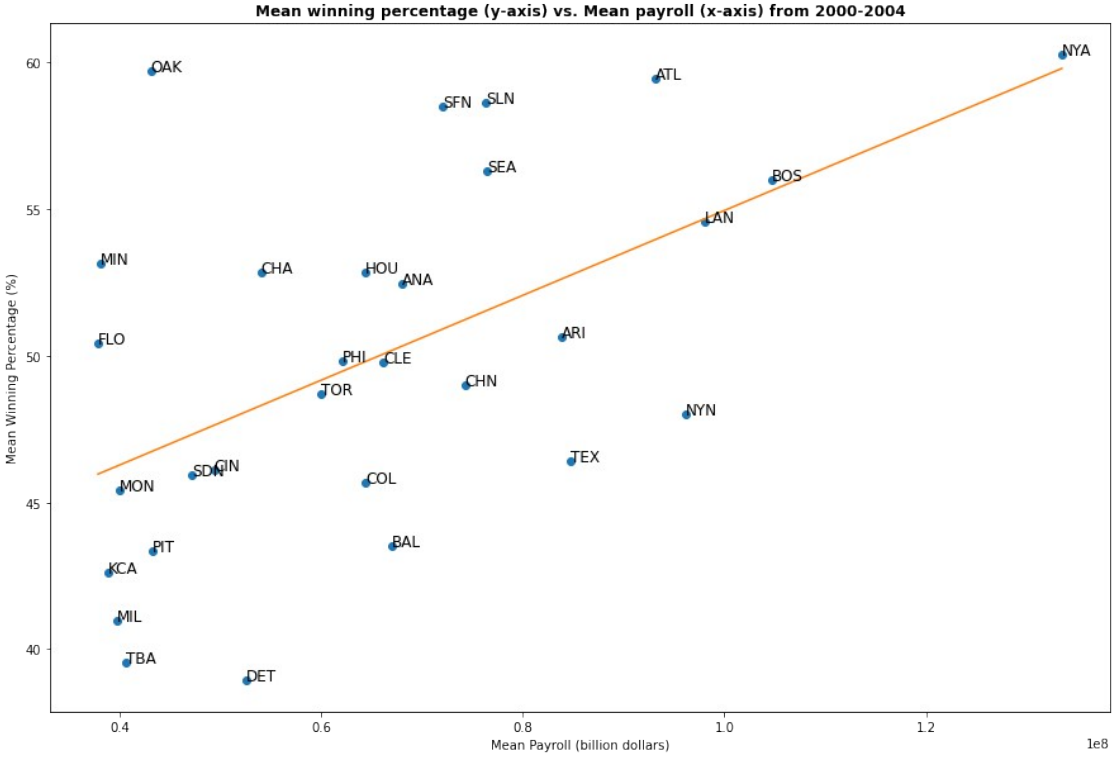
```
#discretize year into five time periods
temp = new_data[['yearID','teamID','total_payroll','win_percentage']]
periods = ["1990-1994", "1995-1999", "2000-2004", "2005-2009", "2010-
2014"]
temp['time_period'] = pd.cut(temp['yearID'], right = False, bins = 5,
labels = periods)
#find mean_payroll and mean_win_percentage
for p in periods:
    table = temp.drop(temp[p != temp['time_period']].index)
    mean_payroll = (table.groupby(['teamID']))['total_payroll'].mean()
    mean_win = (table.groupby(['teamID']))['win_percentage'].mean()
#plot
    z = np.polyfit(x = mean_payroll, y = mean_win, deg = 1)
    f = np.poly1d(z)
    x_new = np.linspace(mean_payroll.min(), mean_payroll.max(), 100)
    y_new = f(x_new)
    plt.figure(figsize=(15,10))
    plt.plot(mean_payroll, mean_win,'o', x_new, y_new)
    for i, txt in enumerate(mean_payroll.index):
        plt.annotate(txt, (mean_payroll[i], mean_win[i]), size = 12)
    plt.title("Mean winning percentage (y-axis) vs. Mean payroll (x-
axis) from " + p, weight = "bold")
    plt.xlabel("Mean Payroll (billion dollars)")
    plt.ylabel("Mean Winning Percentage (%)")
    plt.show()
```

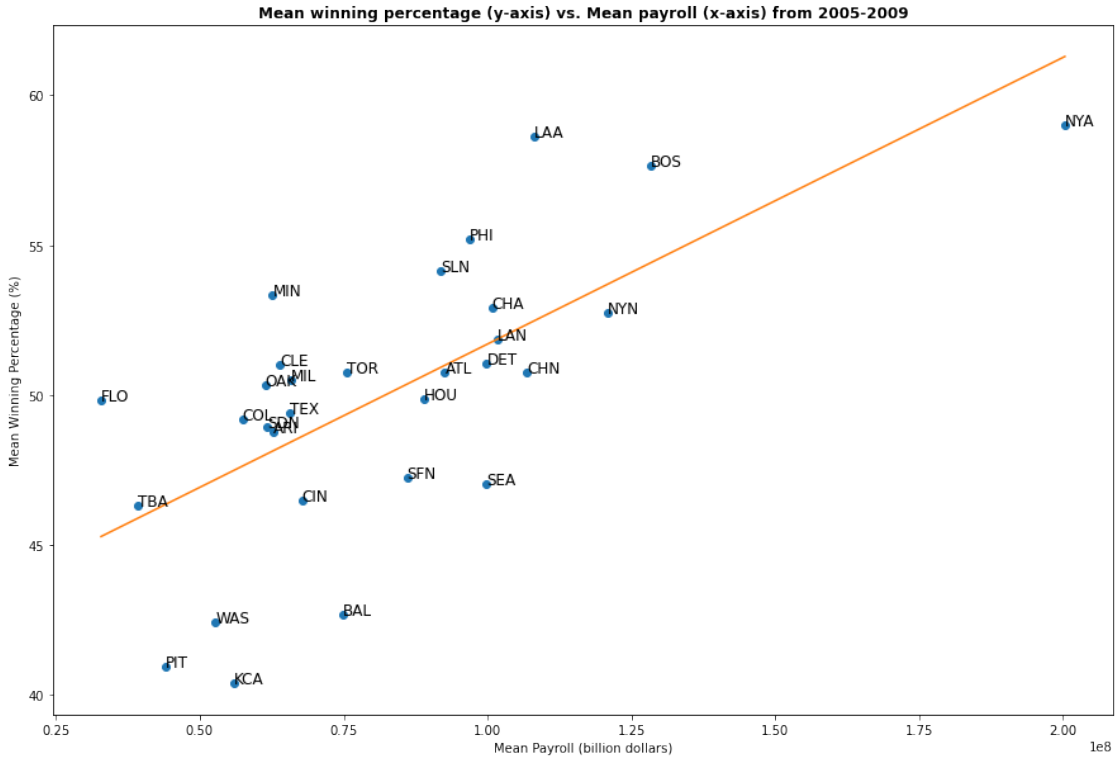
```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:4:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

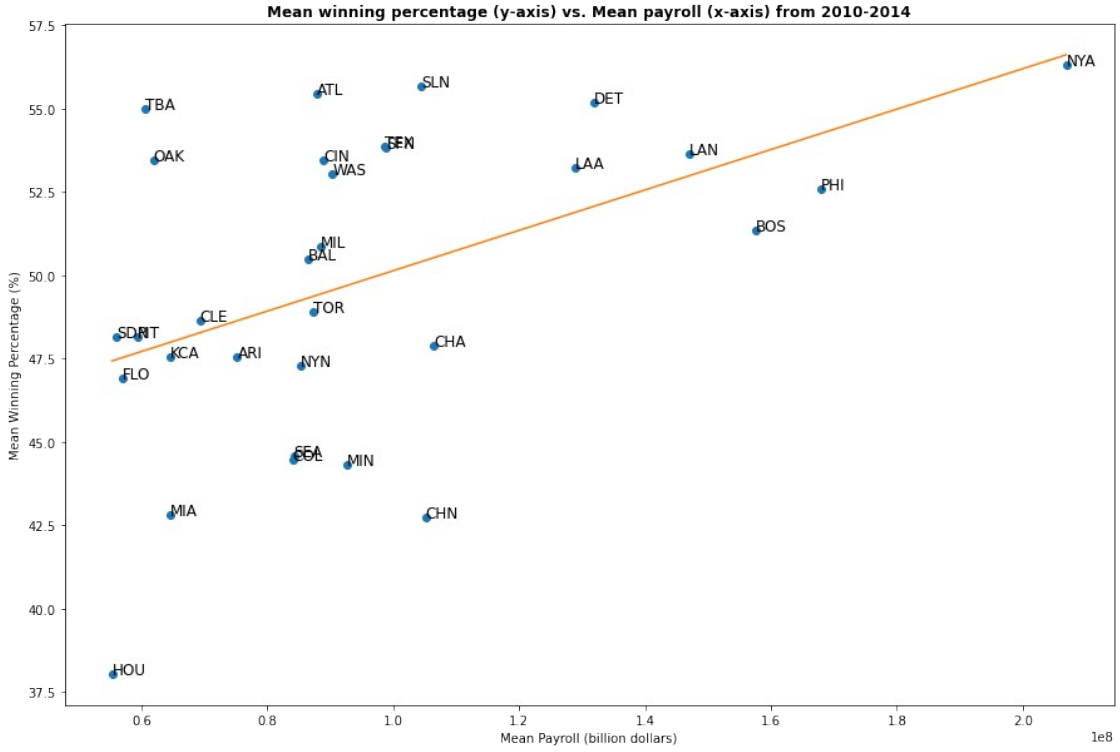
See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  after removing the cwd from sys.path.
```




Mean winning percentage (y-axis) vs. Mean payroll (x-axis) from 1995-1999
Mean Winning Percentage (%)
Mean Payroll (billion dollars)
1e7
ATL
NYA
CLE
HOU
BOS
TEX
CIN
LAN
BAL
NYN
SDN
SEA
ARI
SFN
COL
ANA
CHA
CAL
SLN
ML4
TOR
CHN
OAK
MON
MIL
PIT
FLO
PHI
KCA
MIN
DET
TBA


Mean winning percentage (y-axis) vs. Mean payroll (x-axis) from 2000-2004
Mean Winning Percentage (%)
Mean Payroll (billion dollars)
1e8
NYA
OAK
ATL
SFN
SLN
SEA
BOS
LAN
MIN
CHA
HOU
ANA
FLO
ARI
PHI
CLE
CHN
TOR
NYN
TEX
CIN
SDN
COL
MON
PIT
BAL
KCA
MIL
TBA
DET




QUESTION 2

In general, the more payroll is, the more winning percentage is. The team NYA and BOS are being particularly good at paying for wins across these time periods. For the team OAK, the

team's winning percentage is above the average level while the payroll is not that high, which means the spending efficiency is high.

PROBLEM 5

```
standardTable = new_data
for year, year_df in standardTable.groupby('yearID'):
    #the standard deviation
    sd = year_df['total_payroll'].std()
    #the average
    avg = year_df['total_payroll'].mean()
    for team, team_df in year_df.groupby('teamID'):
        #the standard payroll
        standardTable.loc[(standardTable['yearID'] == year) &
(standardTable['teamID'] == team),'standard_payroll'] =
(team_df['total_payroll'] - avg) / sd
standardTable = standardTable[['yearID', 'teamID', 'total_payroll',
'standard_payroll']]
standardTable
```

```
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1681:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  self.obj[key] = empty_value
/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1773:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  self._setitem_single_column(ilocs[0], value, pi)
```

| | yearID | teamID | total_payroll | standard_payroll |
|---|---|---|---|---|
| 0 | 1997 | ANA | 31135472.0 | -0.698639 |
| 1 | 1998 | ANA | 41281000.0 | -0.086369 |
| 2 | 1999 | ANA | 55388166.0 | 0.271410 |
| 3 | 2000 | ANA | 51464167.0 | -0.190214 |
| 4 | 2001 | ANA | 47535167.0 | -0.721244 |
| 5 | 2002 | ANA | 61721667.0 | -0.232769 |
| 6 | 2003 | ANA | 79031667.0 | 0.288791 |
| 7 | 2004 | ANA | 100534667.0 | 0.960040 |
| 8 | 1998 | ARI | 32347000.0 | -0.667223 |
| 9 | 1999 | ARI | 68703999.0 | 0.919025 |
| 10 | 2000 | ARI | 81027833.0 | 1.190219 |

| | | | | |
|---|---|---|---|---|
| 11 | 2001 | ARI | 85082999.0 | 0.798437 |
| 12 | 2002 | ARI | 102819999.0 | 1.431657 |
| 13 | 2003 | ARI | 80657000.0 | 0.346814 |
| 14 | 2004 | ARI | 69780750.0 | 0.023110 |
| 15 | 2005 | ARI | 62329166.0 | -0.310988 |
| 16 | 2006 | ARI | 59684226.0 | -0.548527 |
| 17 | 2007 | ARI | 52067546.0 | -0.899186 |
| 18 | 2008 | ARI | 66202712.0 | -0.616173 |
| 19 | 2009 | ARI | 73115666.0 | -0.463967 |
| 20 | 2010 | ARI | 60718166.0 | -0.786929 |
| 21 | 2011 | ARI | 53639833.0 | -0.959939 |
| 22 | 2012 | ARI | 73804833.0 | -0.650592 |
| 23 | 2013 | ARI | 90132000.0 | -0.225656 |
| 24 | 2014 | ARI | 97861500.0 | -0.042414 |
| 30 | 1990 | ATL | 14555501.0 | -0.667275 |
| 31 | 1991 | ATL | 18403500.0 | -0.750621 |
| 32 | 1992 | ATL | 34625333.0 | 0.398104 |
| 33 | 1993 | ATL | 41641417.0 | 1.022088 |
| 34 | 1994 | ATL | 49383513.0 | 1.904910 |
| 35 | 1995 | ATL | 47235445.0 | 1.402879 |
| 36 | 1996 | ATL | 49698500.0 | 1.452071 |
| 37 | 1997 | ATL | 52278500.0 | 0.920185 |
| 38 | 1998 | ATL | 61186000.0 | 1.207776 |
| 39 | 1999 | ATL | 73140000.0 | 1.134770 |
| 40 | 2000 | ATL | 84537836.0 | 1.354114 |
| 41 | 2001 | ATL | 91936166.0 | 1.075807 |
| 42 | 2002 | ATL | 92870367.0 | 1.028710 |
| 43 | 2003 | ATL | 106243667.0 | 1.260233 |
| 44 | 2004 | ATL | 90182500.0 | 0.644657 |
| 45 | 2005 | ATL | 86457302.0 | 0.395034 |
| 46 | 2006 | ATL | 90156876.0 | 0.395924 |
| 47 | 2007 | ATL | 87290833.0 | 0.139633 |
| 48 | 2008 | ATL | 102365683.0 | 0.340469 |
| 49 | 2009 | ATL | 96726166.0 | 0.233391 |
| 50 | 2010 | ATL | 84423666.0 | -0.164983 |
| 51 | 2011 | ATL | 87002692.0 | -0.142462 |
| 52 | 2012 | ATL | 82829942.0 | -0.405462 |
| 53 | 2013 | ATL | 87871525.0 | -0.271949 |
| 54 | 2014 | ATL | 97609000.0 | -0.047938 |
| 60 | 1990 | BAL | 9680084.0 | -1.959861 |
| 61 | 1991 | BAL | 17519000.0 | -0.878909 |
| 62 | 1992 | BAL | 23780667.0 | -0.787026 |
| 63 | 1993 | BAL | 29096500.0 | -0.336692 |
| 64 | 1994 | BAL | 38849769.0 | 0.669824 |
| 65 | 1995 | BAL | 43942521.0 | 1.054347 |
| 66 | 1996 | BAL | 54490315.0 | 1.900385 |
| 67 | 1997 | BAL | 58516400.0 | 1.397793 |
| 68 | 1998 | BAL | 72355634.0 | 1.933982 |
| 69 | 1999 | BAL | 80605863.0 | 1.497872 |
| 70 | 2000 | BAL | 81447435.0 | 1.209812 |

| | | | | |
|---|---|---|---|---|
| 71 | 2001 | BAL | 67599540.0 | 0.090826 |
| 72 | 2002 | BAL | 60493487.0 | -0.282509 |
| 73 | 2003 | BAL | 73877500.0 | 0.104792 |
| 74 | 2004 | BAL | 51623333.0 | -0.530064 |
| 75 | 2005 | BAL | 73914333.0 | 0.028010 |
| 76 | 2006 | BAL | 72585582.0 | -0.148670 |
| 77 | 2007 | BAL | 93174808.0 | 0.313165 |
| 78 | 2008 | BAL | 67196246.0 | -0.589891 |
| 79 | 2009 | BAL | 67101666.0 | -0.641596 |
| 80 | 2010 | BAL | 81612500.0 | -0.238738 |
| 81 | 2011 | BAL | 85304038.0 | -0.184083 |
| 82 | 2012 | BAL | 77353999.0 | -0.554194 |
| 83 | 2013 | BAL | 84393333.0 | -0.343179 |
| 84 | 2014 | BAL | 103416000.0 | 0.079116 |
| 90 | 1990 | BOS | 20558333.0 | 0.924213 |
| 91 | 1991 | BOS | 35167500.0 | 1.680823 |
| 92 | 1992 | BOS | 43610584.0 | 1.380034 |
| 93 | 1993 | BOS | 37120583.0 | 0.532422 |
| 94 | 1994 | BOS | 37859084.0 | 0.553665 |
| 95 | 1995 | BOS | 32455518.0 | -0.161466 |
| 96 | 1996 | BOS | 42393500.0 | 0.768629 |
| 97 | 1997 | BOS | 43558750.0 | 0.252554 |
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| 543 | 1997 | NYN | 39800400.0 | -0.035206 |
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| 545 | 1999 | NYN | 65092092.0 | 0.743360 |

| | | | | |
|---|---|---|---|---|
| 546 | 2000 | NYN | 79509776.0 | 1.119336 |
| 547 | 2001 | NYN | 93174428.0 | 1.125923 |
| 548 | 2002 | NYN | 94633593.0 | 1.100119 |
| 549 | 2003 | NYN | 116876429.0 | 1.639812 |
| 550 | 2004 | NYN | 96660970.0 | 0.842026 |
| 551 | 2005 | NYN | 101305821.0 | 0.829521 |
| 552 | 2006 | NYN | 101084963.0 | 0.734622 |
| 553 | 2007 | NYN | 115231663.0 | 0.963675 |
| 554 | 2008 | NYN | 137793376.0 | 1.277660 |
| 555 | 2009 | NYN | 149373987.0 | 1.788392 |
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| 569 | 1993 | OAK | 37812333.0 | 0.607348 |
| 570 | 1994 | OAK | 34172500.0 | 0.121412 |
| 571 | 1995 | OAK | 37739225.0 | 0.397775 |
| 572 | 1996 | OAK | 21243000.0 | -1.210174 |
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| 598 | 1992 | PHI | 24383834.0 | -0.721111 |
| 599 | 1993 | PHI | 28538334.0 | -0.397149 |
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| 602 | 1996 | PHI | 34314500.0 | 0.012772 |
| 603 | 1997 | PHI | 36656500.0 | -0.275920 |
| 604 | 1998 | PHI | 36297500.0 | -0.410377 |
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| 612 | 2006 | PHI | 88273333.0 | 0.337546 |
| 613 | 2007 | PHI | 89428213.0 | 0.202669 |
| 614 | 2008 | PHI | 97879880.0 | 0.221803 |
| 615 | 2009 | PHI | 113004046.0 | 0.714173 |
| 616 | 2010 | PHI | 141928379.0 | 1.343732 |
| 617 | 2011 | PHI | 172976379.0 | 1.964118 |
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| 619 | 2013 | PHI | 169863189.0 | 1.407166 |
| 620 | 2014 | PHI | 180944967.0 | 1.775404 |
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| 627 | 1991 | PIT | 23634667.0 | 0.008105 |
| 628 | 1992 | PIT | 33944167.0 | 0.323665 |
| 629 | 1993 | PIT | 24822467.0 | -0.799626 |
| 630 | 1994 | PIT | 24217250.0 | -1.045846 |
| 631 | 1995 | PIT | 18355345.0 | -1.653864 |
| 632 | 1996 | PIT | 23017500.0 | -1.044155 |
| 633 | 1997 | PIT | 10771667.0 | -2.257802 |
| 634 | 1998 | PIT | 15065000.0 | -1.790831 |
| 635 | 1999 | PIT | 24697666.0 | -1.221223 |
| 636 | 2000 | PIT | 28928334.0 | -1.242493 |
| 637 | 2001 | PIT | 57760833.0 | -0.307378 |
| 638 | 2002 | PIT | 42323599.0 | -1.018364 |
| 639 | 2003 | PIT | 54812429.0 | -0.575813 |
| 640 | 2004 | PIT | 32227929.0 | -1.120952 |
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| 656 | 1990 | SDN | 17588334.0 | 0.136798 |
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| 660 | 1994 | SDN | 14916333.0 | -2.136383 |
| 661 | 1995 | SDN | 26382334.0 | -0.804267 |
| 662 | 1996 | SDN | 28348172.0 | -0.545427 |
| 663 | 1997 | SDN | 37363672.0 | -0.221775 |
| 664 | 1998 | SDN | 46861500.0 | 0.276453 |
| 665 | 1999 | SDN | 49768179.0 | -0.001918 |

| | | | | |
|---|---|---|---|---|
| 666 | 2000 | SDN | 54821000.0 | -0.033472 |
| 667 | 2001 | SDN | 39182833.0 | -1.059289 |
| 668 | 2002 | SDN | 41425000.0 | -1.054757 |
| 669 | 2003 | SDN | 45210000.0 | -0.918610 |
| 670 | 2004 | SDN | 55384833.0 | -0.415468 |
| 671 | 2005 | SDN | 63290833.0 | -0.282848 |
| 672 | 2006 | SDN | 69896141.0 | -0.232025 |
| 673 | 2007 | SDN | 58110567.0 | -0.720963 |
| 674 | 2008 | SDN | 73677616.0 | -0.418435 |
| 675 | 2009 | SDN | 43333700.0 | -1.343604 |
| 676 | 2010 | SDN | 37799300.0 | -1.388237 |
| 677 | 2011 | SDN | 45869140.0 | -1.150341 |
| 678 | 2012 | SDN | 55244700.0 | -1.154703 |
| 679 | 2013 | SDN | 65585500.0 | -0.728346 |
| 680 | 2014 | SDN | 75685700.0 | -0.527607 |
| 686 | 1990 | SEA | 12553667.0 | -1.198008 |
| 687 | 1991 | SEA | 15691833.0 | -1.143920 |
| 688 | 1992 | SEA | 23179833.0 | -0.852687 |
| 689 | 1993 | SEA | 32696333.0 | 0.053217 |
| 690 | 1994 | SEA | 29228500.0 | -0.458275 |
| 691 | 1995 | SEA | 36481311.0 | 0.264634 |
| 692 | 1996 | SEA | 41328501.0 | 0.668989 |
| 693 | 1997 | SEA | 41540661.0 | 0.098038 |
| 694 | 1998 | SEA | 54087036.0 | 0.746229 |
| 695 | 1999 | SEA | 54125003.0 | 0.209976 |
| 696 | 2000 | SEA | 58915000.0 | 0.157692 |
| 697 | 2001 | SEA | 74720834.0 | 0.379047 |
| 698 | 2002 | SEA | 80282668.0 | 0.518926 |
| 699 | 2003 | SEA | 86959167.0 | 0.571795 |
| 700 | 2004 | SEA | 81515834.0 | 0.380624 |
| 701 | 2005 | SEA | 87754334.0 | 0.432987 |
| 702 | 2006 | SEA | 87959833.0 | 0.327830 |
| 703 | 2007 | SEA | 106460833.0 | 0.705002 |
| 704 | 2008 | SEA | 117666482.0 | 0.745230 |
| 705 | 2009 | SEA | 98904166.0 | 0.297720 |
| 706 | 2010 | SEA | 86510000.0 | -0.110245 |
| 707 | 2011 | SEA | 86110600.0 | -0.164320 |
| 708 | 2012 | SEA | 81978100.0 | -0.428598 |
| 709 | 2013 | SEA | 74005043.0 | -0.555922 |
| 710 | 2014 | SEA | 92531100.0 | -0.159040 |
| 716 | 1990 | SFN | 19335333.0 | 0.599968 |
| 717 | 1991 | SFN | 30967666.0 | 1.071680 |
| 718 | 1992 | SFN | 33163168.0 | 0.238316 |
| 719 | 1993 | SFN | 35050000.0 | 0.308151 |
| 720 | 1994 | SFN | 42638666.0 | 1.114074 |
| 721 | 1995 | SFN | 36462777.0 | 0.262672 |
| 722 | 1996 | SFN | 37144725.0 | 0.277563 |
| 723 | 1997 | SFN | 35592378.0 | -0.357394 |
| 724 | 1998 | SFN | 42565834.0 | -0.002834 |
| 725 | 1999 | SFN | 46595057.0 | -0.156243 |

| | | | | |
|---|---|---|---|---|
| 726 | 2000 | SFN | 53737826.0 | -0.084049 |
| 727 | 2001 | SFN | 63280167.0 | -0.083993 |
| 728 | 2002 | SFN | 78299835.0 | 0.438624 |
| 729 | 2003 | SFN | 82852167.0 | 0.425179 |
| 730 | 2004 | SFN | 82019166.0 | 0.395958 |
| 731 | 2005 | SFN | 90199500.0 | 0.504535 |
| 732 | 2006 | SFN | 90056419.0 | 0.392810 |
| 733 | 2007 | SFN | 90219056.0 | 0.225993 |
| 734 | 2008 | SFN | 76594500.0 | -0.341273 |
| 735 | 2009 | SFN | 83026450.0 | -0.171243 |
| 736 | 2010 | SFN | 98641333.0 | 0.208037 |
| 737 | 2011 | SFN | 118198333.0 | 0.621913 |
| 738 | 2012 | SFN | 117620683.0 | 0.539489 |
| 739 | 2013 | SFN | 140180334.0 | 0.799288 |
| 740 | 2014 | SFN | 20000000.0 | -1.745978 |
| 746 | 1990 | SLN | 20523334.0 | 0.914934 |
| 747 | 1991 | SLN | 21860001.0 | -0.249292 |
| 748 | 1992 | SLN | 27583836.0 | -0.371407 |
| 749 | 1993 | SLN | 23367334.0 | -0.957236 |
| 750 | 1994 | SLN | 29275601.0 | -0.452752 |
| 751 | 1995 | SLN | 37101000.0 | 0.330224 |
| 752 | 1996 | SLN | 40269667.0 | 0.569927 |
| 753 | 1997 | SLN | 45456667.0 | 0.397869 |
| 754 | 1998 | SLN | 54672521.0 | 0.784295 |
| 755 | 1999 | SLN | 49778195.0 | -0.001431 |
| 756 | 2000 | SLN | 61453863.0 | 0.276240 |
| 757 | 2001 | SLN | 78538333.0 | 0.533554 |
| 758 | 2002 | SLN | 74660875.0 | 0.291251 |
| 759 | 2003 | SLN | 83786666.0 | 0.458540 |
| 760 | 2004 | SLN | 83228333.0 | 0.432796 |
| 761 | 2005 | SLN | 92106833.0 | 0.560347 |
| 762 | 2006 | SLN | 88891371.0 | 0.356701 |
| 763 | 2007 | SLN | 90286823.0 | 0.227992 |
| 764 | 2008 | SLN | 99624449.0 | 0.267953 |
| 765 | 2009 | SLN | 88528409.0 | -0.008737 |
| 766 | 2010 | SLN | 93540751.0 | 0.074216 |
| 767 | 2011 | SLN | 105433572.0 | 0.309143 |
| 768 | 2012 | SLN | 110300862.0 | 0.340675 |
| 769 | 2013 | SLN | 92260110.0 | -0.182074 |
| 770 | 2014 | SLN | 120693000.0 | 0.457126 |
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| 772 | 1999 | TBA | 38870000.0 | -0.531951 |
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| | | | | |
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| 784 | 2011 | TBA | 41053571.0 | -1.268335 |
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| 786 | 2013 | TBA | 52955272.0 | -0.987002 |
| 787 | 2014 | TBA | 72689100.0 | -0.593171 |
| 793 | 1990 | TEX | 14874372.0 | -0.582735 |
| 794 | 1991 | TEX | 18224500.0 | -0.776583 |
| 795 | 1992 | TEX | 30128167.0 | -0.093356 |
| 796 | 1993 | TEX | 36376959.0 | 0.451878 |
| 797 | 1994 | TEX | 32973597.0 | -0.019160 |
| 798 | 1995 | TEX | 34581451.0 | 0.063548 |
| 799 | 1996 | TEX | 39041528.0 | 0.455024 |
| 800 | 1997 | TEX | 53448838.0 | 1.009793 |
| 801 | 1998 | TEX | 56572095.0 | 0.907798 |
| 802 | 1999 | TEX | 76709931.0 | 1.308393 |
| 803 | 2000 | TEX | 70795921.0 | 0.712455 |
| 804 | 2001 | TEX | 88633500.0 | 0.942137 |
| 805 | 2002 | TEX | 105526122.0 | 1.541251 |
| 806 | 2003 | TEX | 103491667.0 | 1.161989 |
| 807 | 2004 | TEX | 55050417.0 | -0.425656 |
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| 817 | 2014 | TEX | 112255059.0 | 0.272509 |
| 823 | 1990 | TOR | 17756834.0 | 0.181472 |
| 824 | 1991 | TOR | 19902417.0 | -0.533219 |
| 825 | 1992 | TOR | 44788666.0 | 1.508778 |
| 826 | 1993 | TOR | 47279166.0 | 1.632731 |
| 827 | 1994 | TOR | 43433668.0 | 1.207288 |
| 828 | 1995 | TOR | 50590000.0 | 1.757933 |
| 829 | 1996 | TOR | 29555083.0 | -0.432510 |
| 830 | 1997 | TOR | 47079833.0 | 0.522147 |
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| 832 | 1999 | TOR | 45444333.0 | -0.212209 |
| 833 | 2000 | TOR | 44838332.0 | -0.499598 |
| 834 | 2001 | TOR | 76895999.0 | 0.467083 |
| 835 | 2002 | TOR | 76864333.0 | 0.380488 |
| 836 | 2003 | TOR | 51269000.0 | -0.702310 |
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| 840 | 2007 | TOR | 81942800.0 | -0.018094 |

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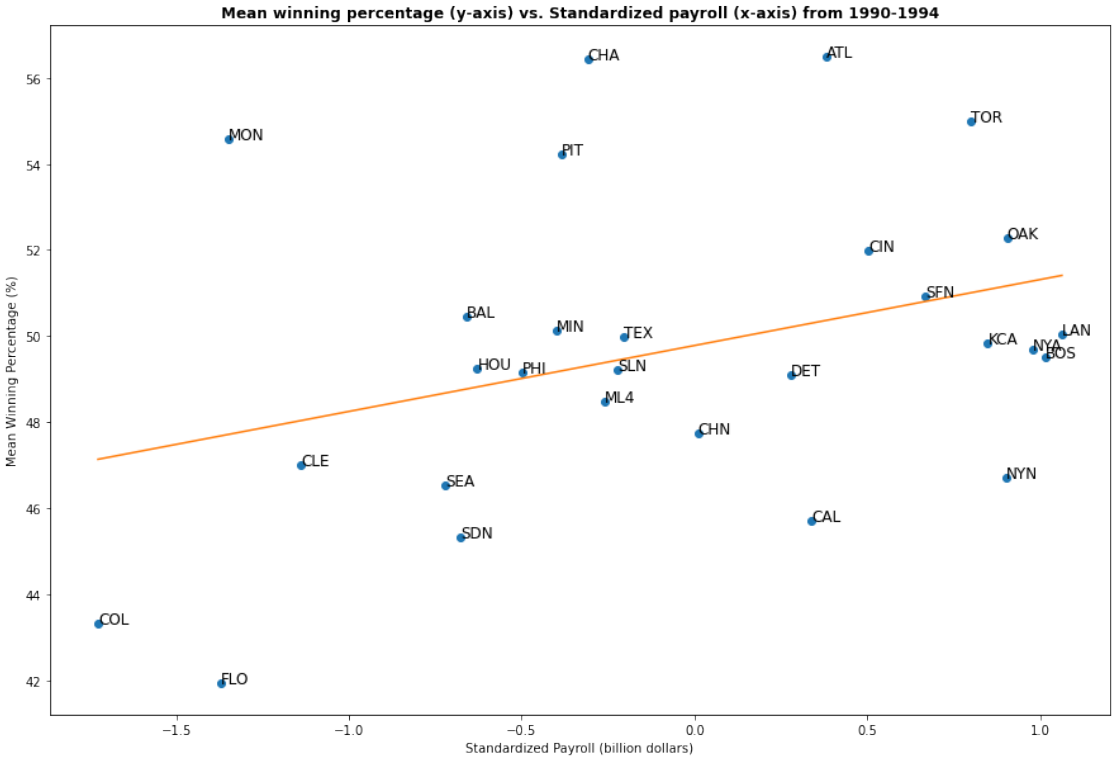
841    2008    TOR     97793900.0          0.219528
842    2009    TOR     80538300.0         -0.244733
843    2010    TOR     62234000.0         -0.747159
844    2011    TOR     62567800.0         -0.741181
845    2012    TOR     75009200.0         -0.617881
846    2013    TOR    126288100.0          0.514788
847    2014    TOR    109920100.0          0.221422
848    2005    WAS     48581500.0         -0.713263
849    2006    WAS     63143000.0         -0.441328
850    2007    WAS     36947500.0         -1.345112
851    2008    WAS     54961000.0         -0.913557
852    2009    WAS     59928000.0         -0.853477
853    2010    WAS     61400000.0         -0.769040
854    2011    WAS     63856928.0         -0.709594
855    2012    WAS     80855143.0         -0.459099
856    2013    WAS    113703270.0          0.257062
857    2014    WAS    131983680.0          0.704160
```

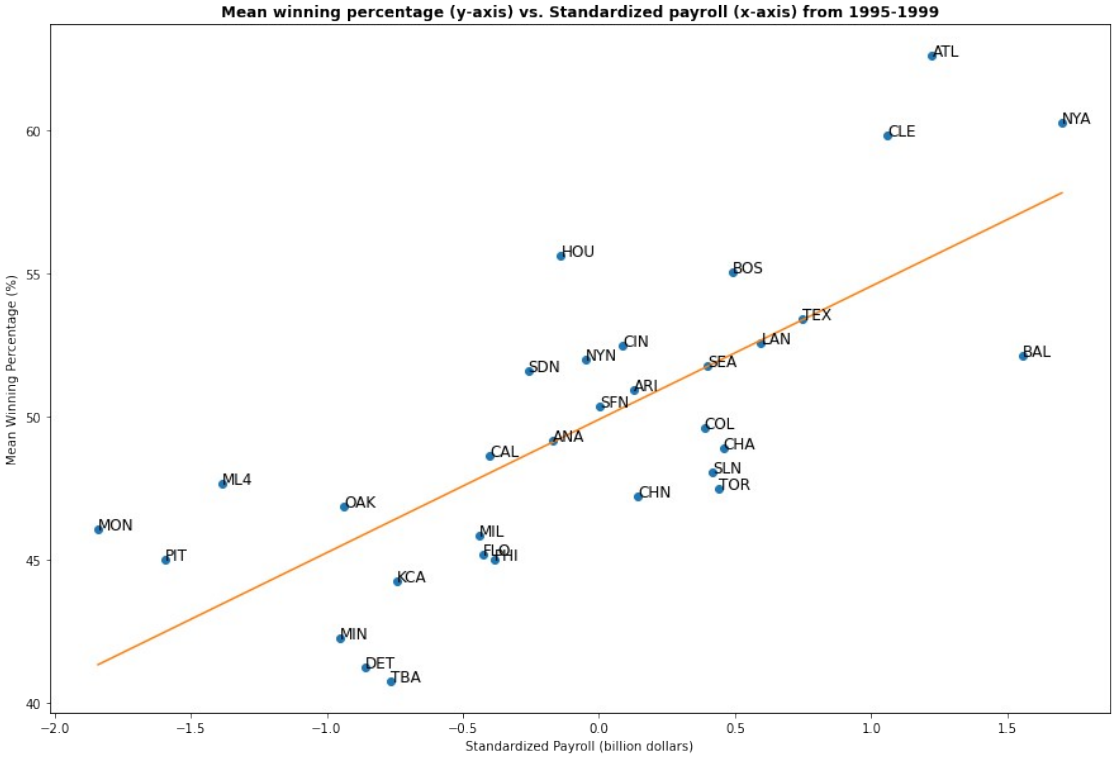
PROBLEM 6

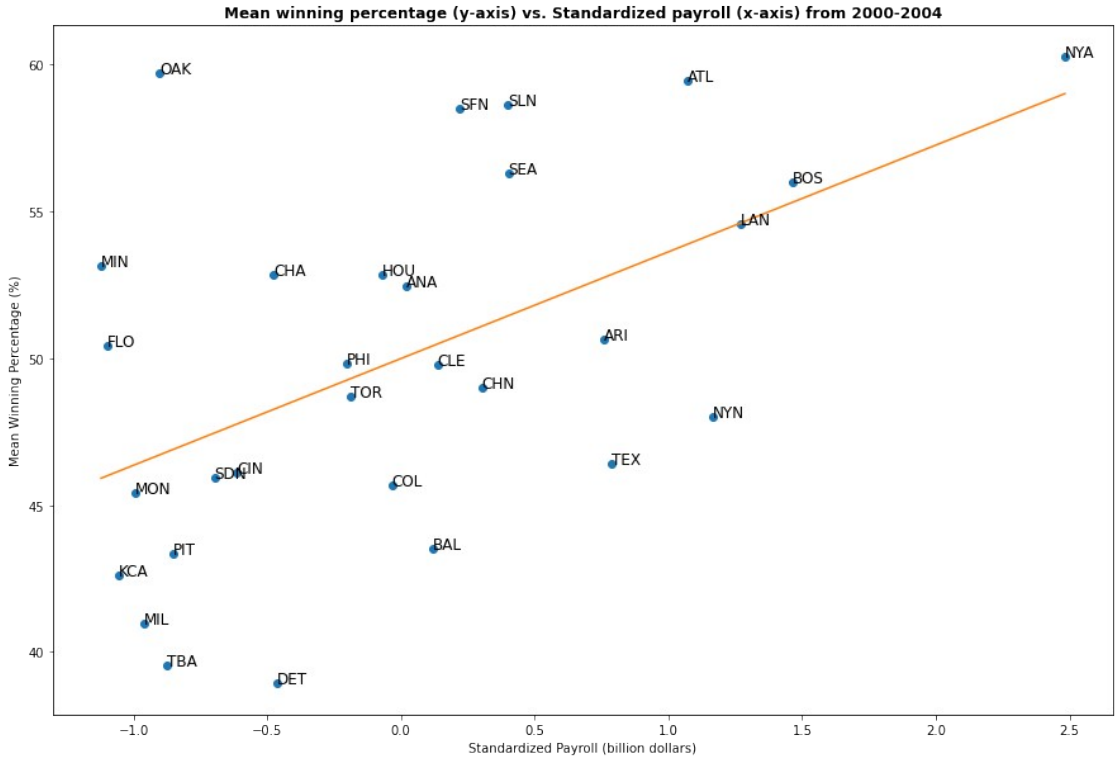
```
temp['standard_payroll'] = standardTable['standard_payroll'].values
#find mean_payroll and mean_win_percentage
for p in periods:
    table = temp.drop(temp[p != temp['time_period']].index)
    mean_std = (table.groupby(['teamID']))['standard_payroll'].mean()
    mean_win = (table.groupby(['teamID']))['win_percentage'].mean()
#plot
    z = np.polyfit(x = mean_std, y = mean_win, deg = 1)
    f = np.poly1d(z)
    x_new = np.linspace(mean_std.min(), mean_std.max(), 100)
    y_new = f(x_new)
    plt.figure(figsize=(15,10))
    plt.plot(mean_std, mean_win,'o', x_new, y_new)
    for i, txt in enumerate(mean_std.index):
        plt.annotate(txt, (mean_std[i], mean_win[i]), size = 12)
    plt.title("Mean winning percentage (y-axis) vs. Standardized
payroll (x-axis) from " + p, weight = "bold")
    plt.xlabel("Standardized Payroll (billion dollars)")
    plt.ylabel("Mean Winning Percentage (%)")
    plt.show()
```

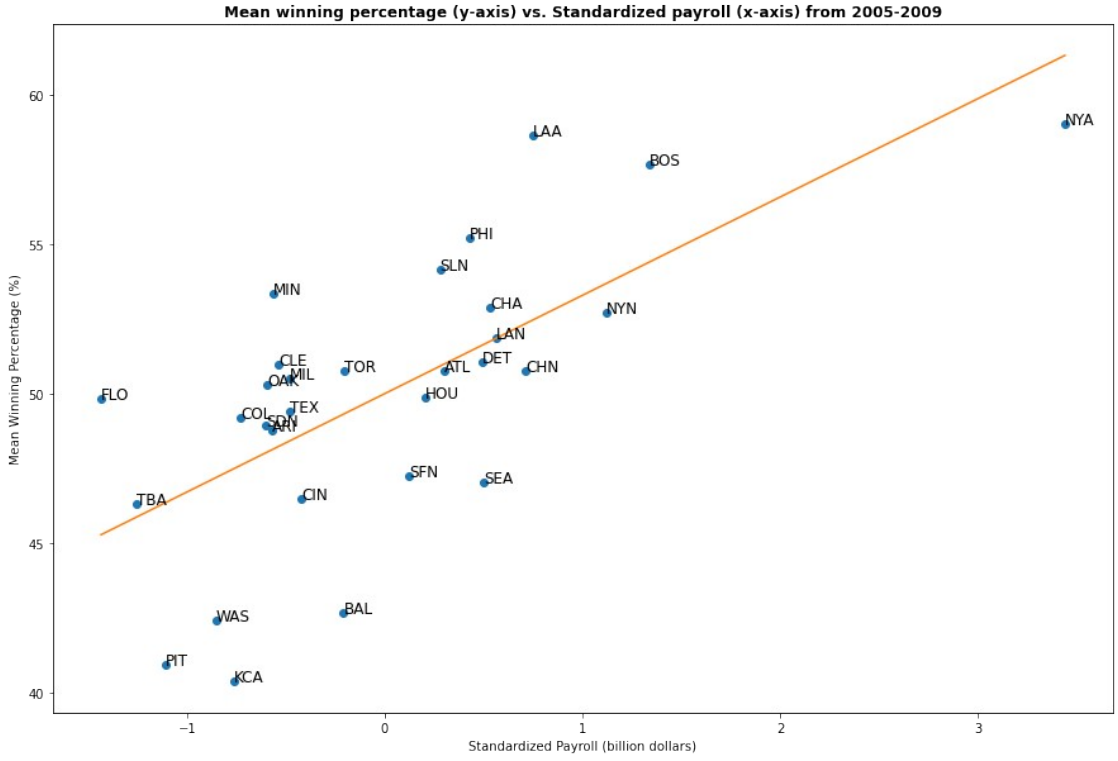
```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  """Entry point for launching an IPython kernel.
```


Mean winning percentage (y-axis) vs. Standardized payroll (x-axis) from 1990-1994
Mean Winning Percentage (%)
Standardized Payroll (billion dollars)
CHA
ATL
TOR
MON
PIT
OAK
CIN
SFN
BAL
MIN
TEX
LAN
KCA
NYA
BOS
HOU
PHI
SLN
DET
ML4
CHN
CLE
NYN
SEA
CAL
SDN
COL
FLO


Mean winning percentage (y-axis) vs. Standardized payroll (x-axis) from 1995-1999
Mean Winning Percentage (%)
Standardized Payroll (billion dollars)
ATL
NYA
CLE
HOU
BOS
TEX
LAN
CIN
NYN
SDN
SEA
BAL
ARI
SFN
COL
ANA
CHA
CAL
SLN
TOR
ML4
CHN
OAK
MON
MIL
PIT
FLO
PHI
KCA
MIN
DET
TBA


Mean winning percentage (y-axis) vs. Standardized payroll (x-axis) from 2000-2004
Mean Winning Percentage (%)
Standardized Payroll (billion dollars)
NYA
OAK
ATL
SFN
SLN
SEA
BOS
LAN
MIN
CHA
HOU
ANA
FLO
ARI
PHI
CLE
CHN
TOR
NYN
TEX
SDN
CIN
COL
MON
PIT
BAL
KCA
MIL
TBA
DET


Mean winning percentage (y-axis) vs. Standardized payroll (x-axis) from 2005-2009
Mean Winning Percentage (%)
Standardized Payroll (billion dollars)
NYA
LAA
BOS
PHI
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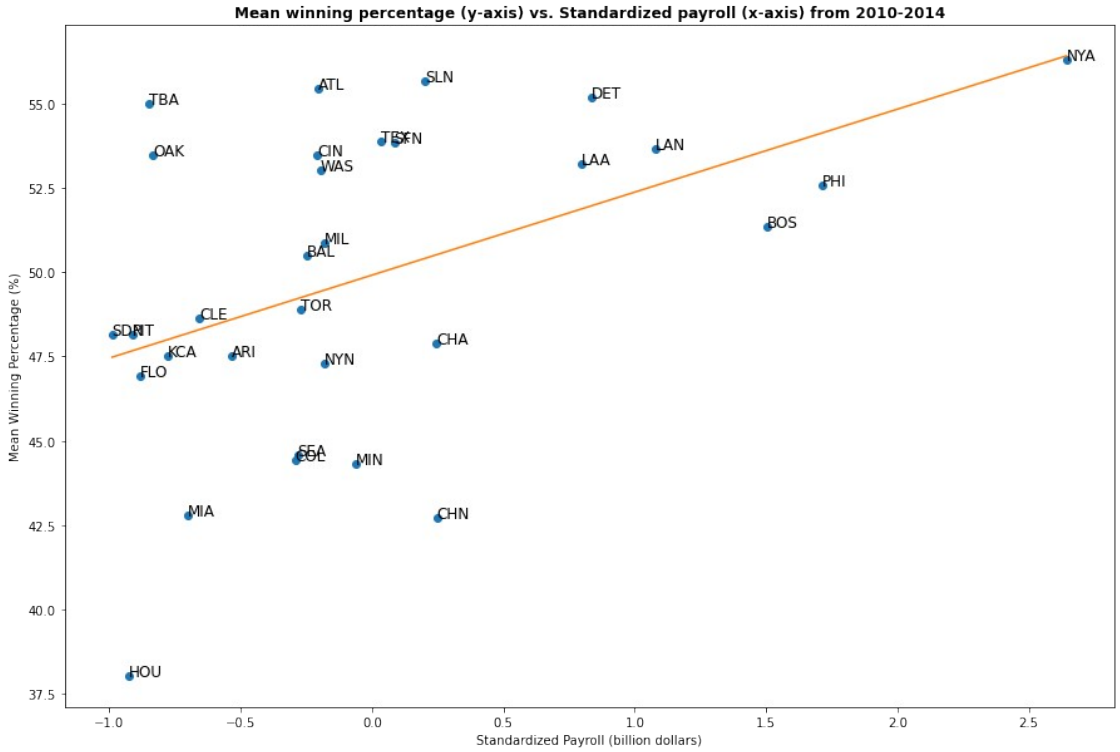



QUESTION 3

The main trend is the same for the problem 4 and problem 6, and the scatter of the data are similar. The advantage of the problem 4 is we can know the relationship between the mean, and the advantafe of the problem 6 is we can know the relationship between the standard deviation.

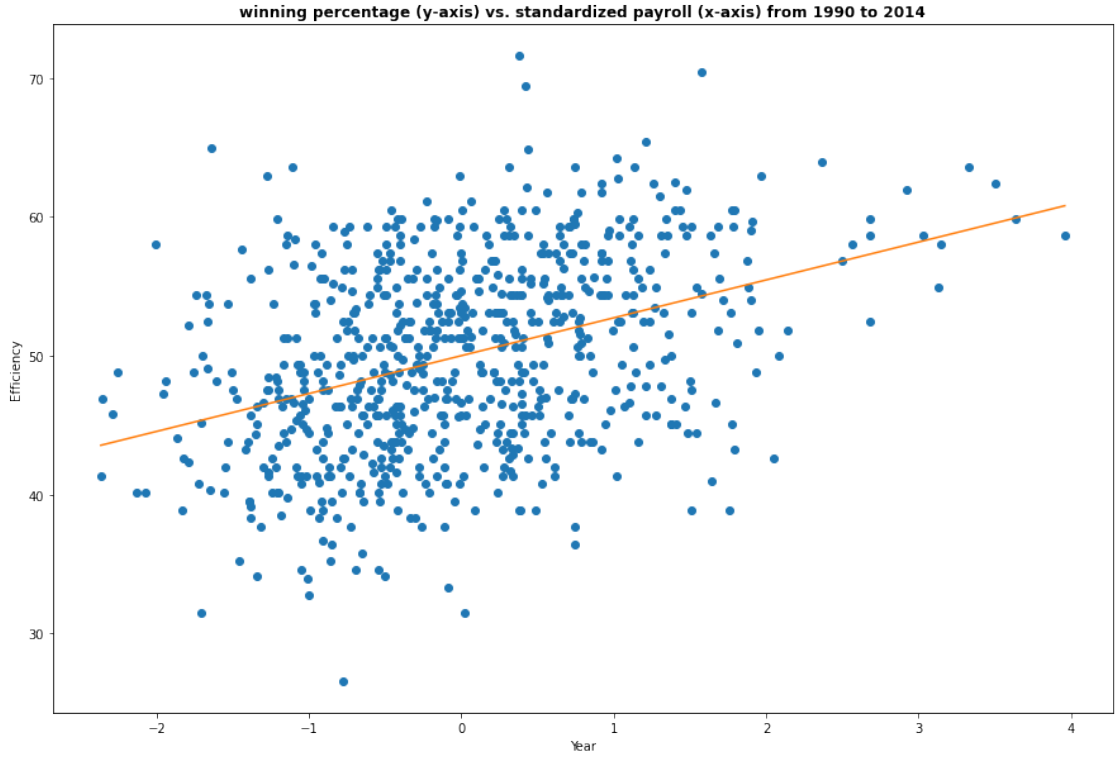
PROBLEM 7

```
relation =
new_data[['yearID','teamID','total_payroll','win_percentage']]
relation['standard_payroll'] = standardTable['standard_payroll']
#plot
x_data = relation['standard_payroll'].values
y_data = relation['win_percentage'].values
z = np.polyfit(x = x_data, y = y_data, deg = 1)
f = np.poly1d(z)
x_new = np.linspace(x_data.min(), x_data.max(), 100)
y_new = f(x_new)
plt.figure(figsize=(15,10))
plt.plot(x_data, y_data,'o',x_new,y_new)
plt.title("winning percentage (y-axis) vs. standardized payroll (x-
axis) from 1990 to 2014", weight='bold')
plt.xlabel("Year")
plt.ylabel("Efficiency")
plt.show()
#the the expected win percentage with given formula
```

```
relation['expected_win_percentage']  = relation['standard_payroll'] *
2.5 + 50
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:2:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
```



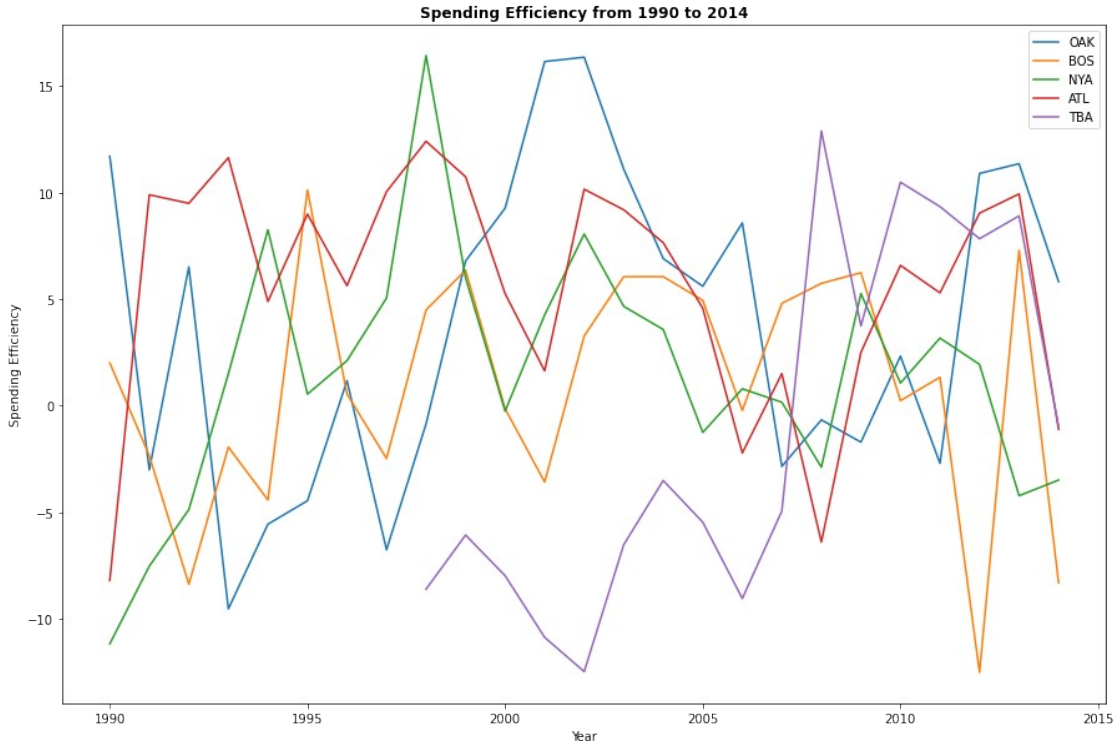

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:17:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
```

PROBLEM 8

```
relation['spending_efficiency'] = relation['win_percentage'] -
relation['expected_win_percentage']
efficiency_pivot = relation.pivot(index = 'yearID', columns =
'teamID', values = 'spending_efficiency')
```

```
teams = ['OAK', 'BOS', 'NYA', 'ATL', 'TBA']
plt.figure(figsize=(15,10))
plt.title("Spending Efficiency from 1990 to 2014", weight='bold')
plt.xlabel("Year")
plt.ylabel("Spending Efficiency")
for team in teams:
    plt.plot(efficiency_pivot[team],label = str(team))
plt.legend()
plt.show()
```




QUESTION 4

From this graph, we can know the relationship between the speeding efficiency from 1990 to 2014. We can conclude the speeding efficnecy for each team is not stable, and they varies from year to year. However, the payroll still plays an important role to develop a team. Oakland A's spending efficiency peaked around the Moneyball period (2002).