

```
[10]: import pandas as pd

data = {
    'Promotional Visits': [1, 2, 3, 4, 5, 6, 7, 8, 9, 10],
    'Total Cost of Promotion': [5, 10, 15, 20, 25, 30, 35, 40, 45, 50],
    'Total Return': [30, 50, 60, 70, 80, 86, 90, 94, 96, 98]
}

df = pd.DataFrame(data)
```

```
[14]: # Calculate marginal return and marginal cost
df['Marginal Return'] = df['Total Return'].diff()
df['Marginal Cost'] = df['Total Cost of Promotion'].diff()
```

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[15]: df
```

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[15]:
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	Promotional Visits	Total Cost of Promotion	Total Return	Marginal Return	Marginal Cost
0	1	5	30	NaN	NaN
1	2	10	50	20.0	5.0
2	3	15	60	10.0	5.0
3	4	20	70	10.0	5.0
4	5	25	80	10.0	5.0
5	6	30	86	6.0	5.0
6	7	35	90	4.0	5.0

[16]:

```
# Calculate marginal return for the last visit  
last_visit_marginal_return = df['Marginal Return'].iloc[-1]
```

[17]: last_visit_marginal_return

[17]: 2.0

```
[19]: # Find the index where marginal return equals marginal cost  
optimal_index = (df['Marginal Return'] - df['Marginal Cost']).abs().idxmin()  
optimal_index
```

[19]: 5

[]:

```
# Extract the optimal number of visits and marginal return for this point  
optimal_visits = df.loc[optimal_index, 'Promotional Visits']  
marginal_return_optimal = df.loc[optimal_index, 'Marginal Return']
```

[20]: optimal_visits

[20]: 6

[21]: marginal_return_optimal

[21]: 6.0

`IndexError: single positional indexer is out-of-bounds`

[]: Should Stark Corp. do more or less promotional visits? Why?

To determine whether Stark Corp. should do more or less promotional visits, we need to consider the marginal return on investment. As the number of promotional visits increases, we need to see how much additional return is generated for each extra visit. Let's calculate the marginal return for each visit.

What is the marginal cost for an additional visit?

Marginal cost is the additional cost incurred for each additional promotional visit.

It can be calculated by taking the difference in total cost between two consecutive promotional visit levels. We'll then use this to calculate the marginal cost for the last visit.

What are the optimal number of visits? What is the marginal return for this?

The optimal number of visits is where the marginal return equals the marginal cost. This is the point where the additional cost of making another visit equals the additional return it generates.

[]:

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1) Which is the most important channel for the company? What additional data is required to answer this?

To determine the most important channel, we typically look at the ROI and mROI. However, without the actual revenue and spend values, we cannot definitively say which channel is the most important in terms of generating revenue efficiently. Based on the provided mROI values, the "Mobile App" has the highest mROI (30x), suggesting that increasing investment in this channel may result in a substantial increase in revenue for a small increase in spend.

2) If Stark Corp. wants to make additional investment in a channel, what parameters should they look at? Which of the above channels should they consider?

When considering additional investment in a channel, Stark Corp. should look at both ROI and mROI:

ROI (Return on Investment): Higher ROI indicates efficient revenue generation compared to the current level of investment. Among the provided channels, "Website" has the highest ROI (20x).

mROI (Marginal Return on Investment): Higher mROI suggests that increasing the spend in that channel could result in more additional revenue compared to other channels. In this case, "Mobile App" has the highest mROI (30x), indicating potential for additional revenue with increased spend.

3) What is the total spend on visits?

Unfortunately, the DataFrame provided does not include spend values for each channel, so we cannot calculate the total spend on visits based on the given data. If you can provide the spend values for each channel, we can proceed to calculate the total spend on visits.

9

10

50

98

2.0

5.0

```
[29]: (df['Marginal Return'] - df['Marginal Cost']).abs()
```

```
[29]: 0      NaN
      1     15.0
      2      5.0
      3      5.0
      4      5.0
      5      1.0
      6      1.0
      7      1.0
      8      3.0
      9      3.0
      dtype: float64
```

```
[34]: (df['Marginal Return'] - df['Marginal Cost']).abs().idxmin()
```

```
[34]: 5
```

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```
[21]: marginal_return_optimal
```

```
[21]: 6.0
```

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[13]:
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```
# Print the corrected results
print("1. Should Stark Corp. do more or less promotional visits? Why?")
if last_visit_marginal_return > last_visit_marginal_cost:
    print("    Stark Corp. should do more promotional visits as the marginal return for the last visit is greater than the marginal cost.")
else:
    print("    Stark Corp. should do less promotional visits as the marginal return for the last visit is less than the marginal cost.")

print("2. What is the marginal cost for an additional visit?")
print(f"    The marginal cost for the last visit is: ${last_visit_marginal_cost}")

print("3. What are the optimal number of visits? What is the marginal return for this?")
print(f"    The optimal number of visits is: {optimal_visits}")
print(f"    The marginal return for the optimal number of visits is: ${marginal_return_optimal}")
```

1. Should Stark Corp. do more or less promotional visits? Why?
Stark Corp. should do less promotional visits as the marginal return for the last visit is less than the marginal cost.
 2. What is the marginal cost for an additional visit?
The marginal cost for the last visit is: \$5.0
 3. What are the optimal number of visits? What is the marginal return for this?
The optimal number of visits is: 6
The marginal return for the optimal number of visits is: \$6.0
- Should Stark Corp. do more or less promotional visits? Why?
- For optimal visits, we need to consider the marginal return on investment.