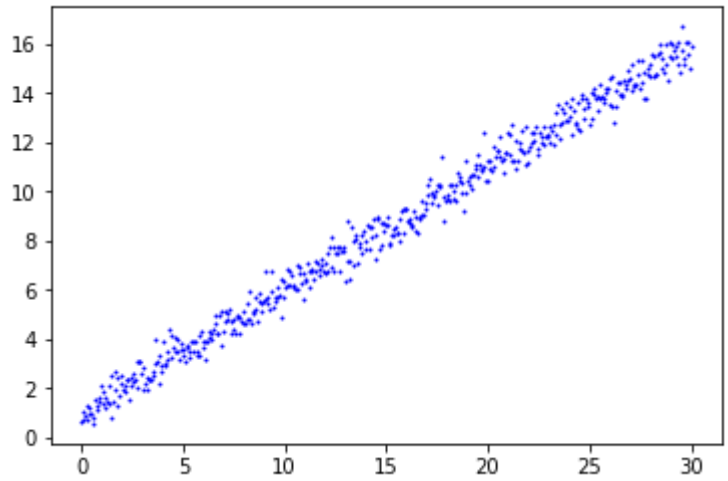
In [1]:

```
#Генерирую датасет и визуализирую выборку
import numpy as np
import math
import matplotlib.pyplot as plt
%matplotlib inline
epsilons = np.random.normal(0, math.sqrt(0.2), 500)
x = np.linspace(0, 30, 500)
real = np.array([0.5 * x[i] + 1 + epsilons[i] for i in range(0, 500)])
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
plt.figure(figsize = (18, 8))
```

Out[1]:

```
<matplotlib.figure.Figure at 0x80545f8>
```




```
<matplotlib.figure.Figure at 0x80545f8>
```

In [2]:

```
#Восстанавливаем зависимость y(x)
from sklearn.metrics import mean_squared_error
from sklearn.metrics import mean_absolute_error

def mse(data):
    predicted = [data[0] * i + data[1] for i in x]
    return mean_squared_error(predicted, real)

def mae(data):
    predicted = [data[0] * i + data[1] for i in x]
    return mean_absolute_error(predicted, real)

from scipy.optimize import minimize
answer_mse = minimize(mse,[0,0])
answer_mae = minimize(mae,[0,0])

print answer_mse.x
print answer_mae.x
```

```
[ 0.49740823  1.03601243]
[ 0.49985314  1.01349308]
```

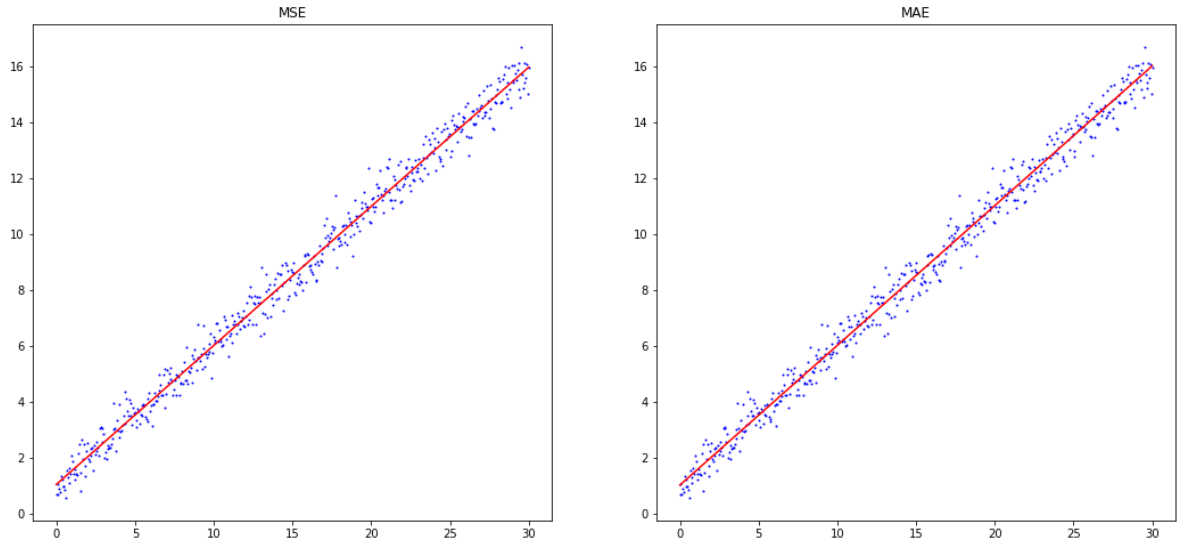
In [3]:

```
#Строим график прямой, полученной методом MSE
plt.figure(figsize = (18, 8))
plt.subplot(1,2,1)
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
plt.plot(x, [i * answer_mse.x[0] + answer_mse.x[1] for i in x], 'red')
plt.title('MSE')

#Построим также просто для сравненя, график прямой, полученной методом MAE
plt.subplot(1,2,2)
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
plt.plot(x, [i * answer_mae.x[0] + answer_mae.x[1] for i in x], 'red')
plt.title('MAE')
```

Out[3]:

```
<matplotlib.text.Text at 0x9aa50b8>
```

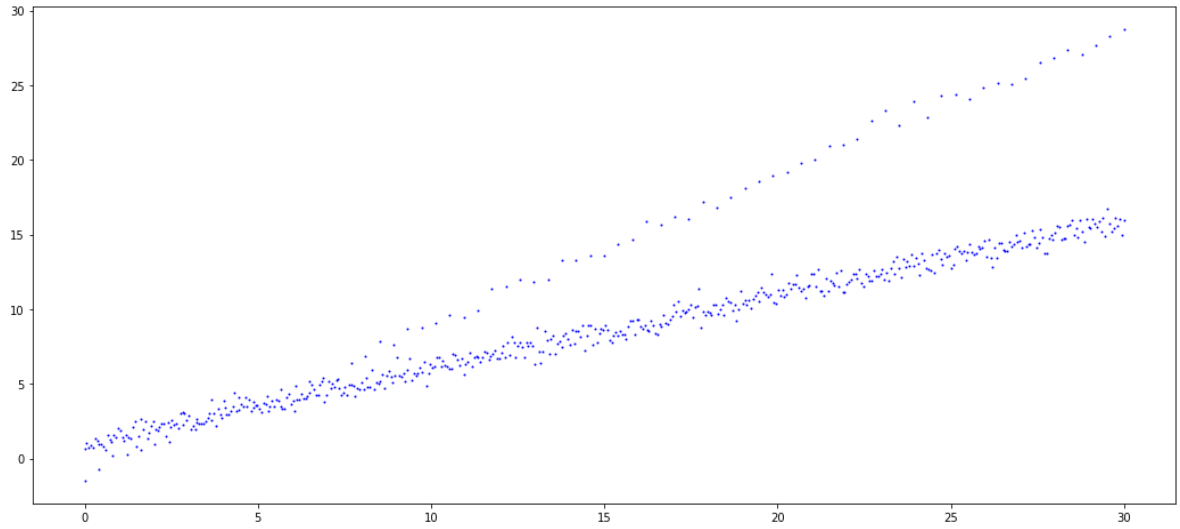


In [4]:

```
#Добавляем выбросы и визуализируем измененный датасет
x_add = np.linspace(0, 30, 75)
epsilons_add = np.random.normal(0, math.sqrt(0.2), 75)
real_add = np.array([x_add[i] - 1 + epsilons_add[i] for i in range(0, 75)])
x = np.append(x, x_add)
real = np.append(real, real_add)
plt.figure(figsize = (18, 8))
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
```

Out[4]:

```
<matplotlib.collections.PathCollection at 0x9d95048>
```



In [5]:

```
#Решаем задачу нахождения коэффициентов для измененного датасета
answer_mse = minimize(mse,[0,0])
answer_mae = minimize(mae,[0,0])
print answer_mse.x
print answer_mae.x
```

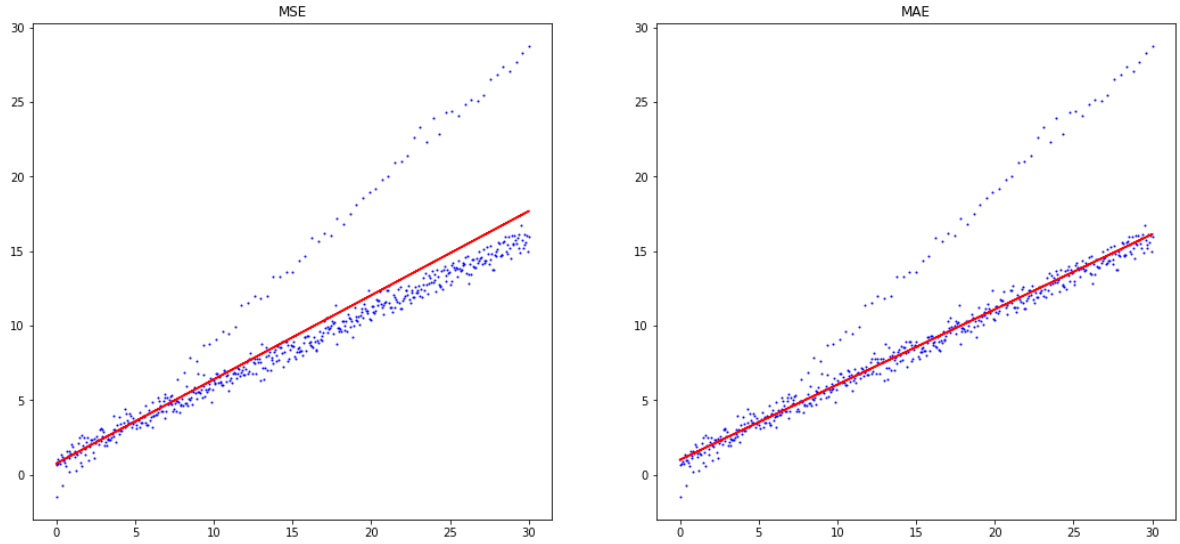
```
[ 0.56420681  0.74795032]
[ 0.50455984  0.99283788]
```

In [7]:

```
#визуализируем полученные прямые
plt.figure(figsize = (18, 8))
plt.subplot(1,2,1)
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
plt.plot(x, [i * answer_mse.x[0] + answer_mse.x[1] for i in x], 'red')
plt.title('MSE')
plt.subplot(1,2,2)
plt.scatter(x, real, c = 'blue', alpha = 1, s = 1)
plt.plot(x, [i * answer_mae.x[0] + answer_mae.x[1] for i in x], 'red')
plt.title('MAE')
```

Out[7]:

```
<matplotlib.text.Text at 0xa3b96d8>
```



Видим, что MAE является более устойчивым к выбросам.