In [41]:
```
from matplotlib.colors import ListedColormap
from sklearn import model_selection, datasets, metrics, neighbors
from scipy.optimize import minimize

%matplotlib inline
%pylab inline

import numpy as np
```

```
Populating the interactive namespace from numpy and matplotlib
```

In [42]:
```
noise = np.random.normal(0, 0.2**0.5, size=500)
```

In [43]:
```
x = np.random.uniform(0, 100, size=500)
```

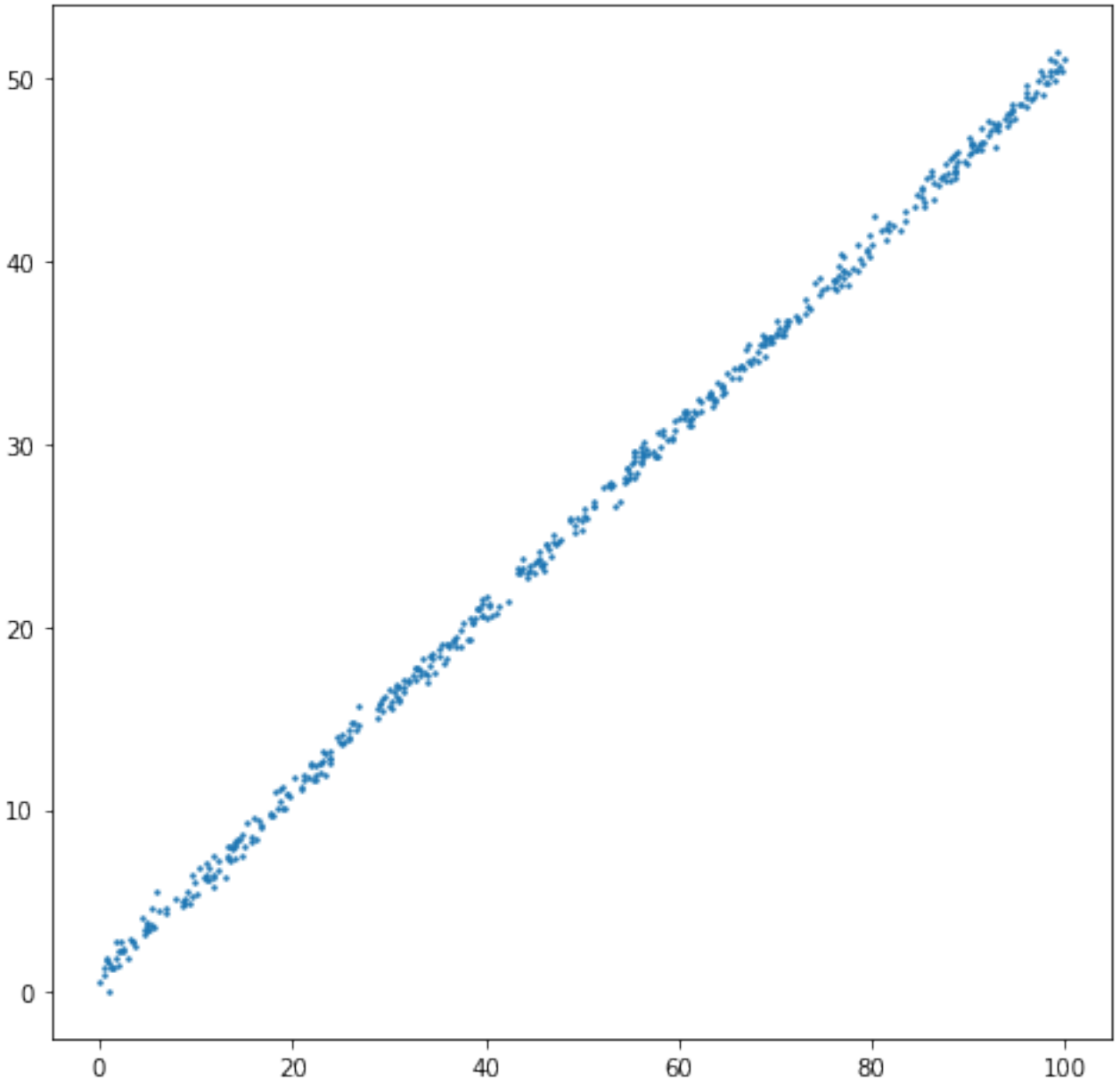
Нарисуем наши точки

In [44]:
```
y = 0.5 * x + 1 + noise
```

In [45]:
```
colors = ListedColormap(['red', 'yellow'])

pyplot.figure(figsize(8, 8))
pyplot.scatter(x, y, s=2,cmap = colors)
```

Out[45]:
```
<matplotlib.collections.PathCollection at 0x7fb014f14790>
```



MSE

In [46]:
```
result = minimize(lambda args: ((args[0] * x + args[1] - y)**2).sum(), [1., 0.],
                                  method='BFGS')
```

In [47]:
```
print result.x
```

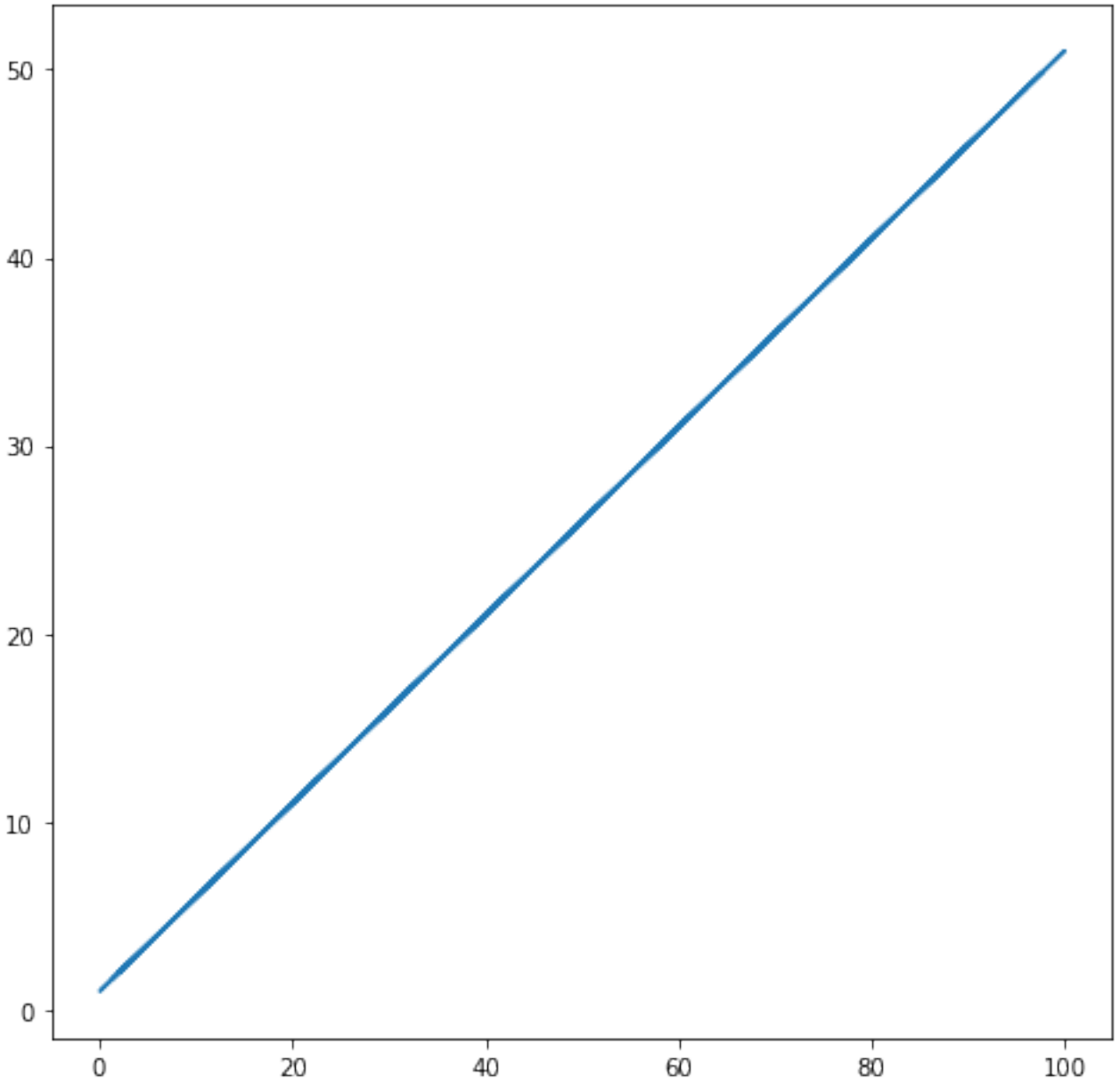
```
[ 0.50040566  0.97991168]
```

Значения максимально близки к истинным (без шума)

In [48]:
```
colors = ListedColormap(['red', 'yellow'])

pyplot.figure(figsize(8, 8))
pyplot.plot(x, result.x[0] * x + result.x[1])
```

Out[48]:
```
[<matplotlib.lines.Line2D at 0x7fb014a88b90>]
```



Добавим выбросы

In [49]:
```
noise_2 = np.random.normal(0, 0.2**0.5, size=75)
```

In [50]:
```
x_2 = np.random.uniform(0, 100, size=75)
```

In [51]:
```
y_2 = -1 + noise_2
```

In [52]:
```
y = np.concatenate((y, y_2))
```

In [53]:
```
x = np.concatenate((x, x_2))
```

In [54]:
```
pairs = zip(x, y)
```

In [55]:
```
np.random.shuffle(pairs)
```

In [56]:
```
x, y = zip(*pairs)
```

In [57]:
```
result_2 = minimize(lambda args: ((args[0] * x + args[1] - y)**2).sum(), [1., 0.],
                                    method='BFGS')
```

```
/home/valeriyasin/anaconda3/envs/python2/lib/python2.7/site-packages/ipykernel/__main__.py:1: VisibleDeprecationWarning: using a non-integer number instead of an integer will result in an error in the future
  if __name__ == '__main__':
```

Модель не справляется, результат сильно отличается от правильного

In [58]:
```
print result_2.x
```

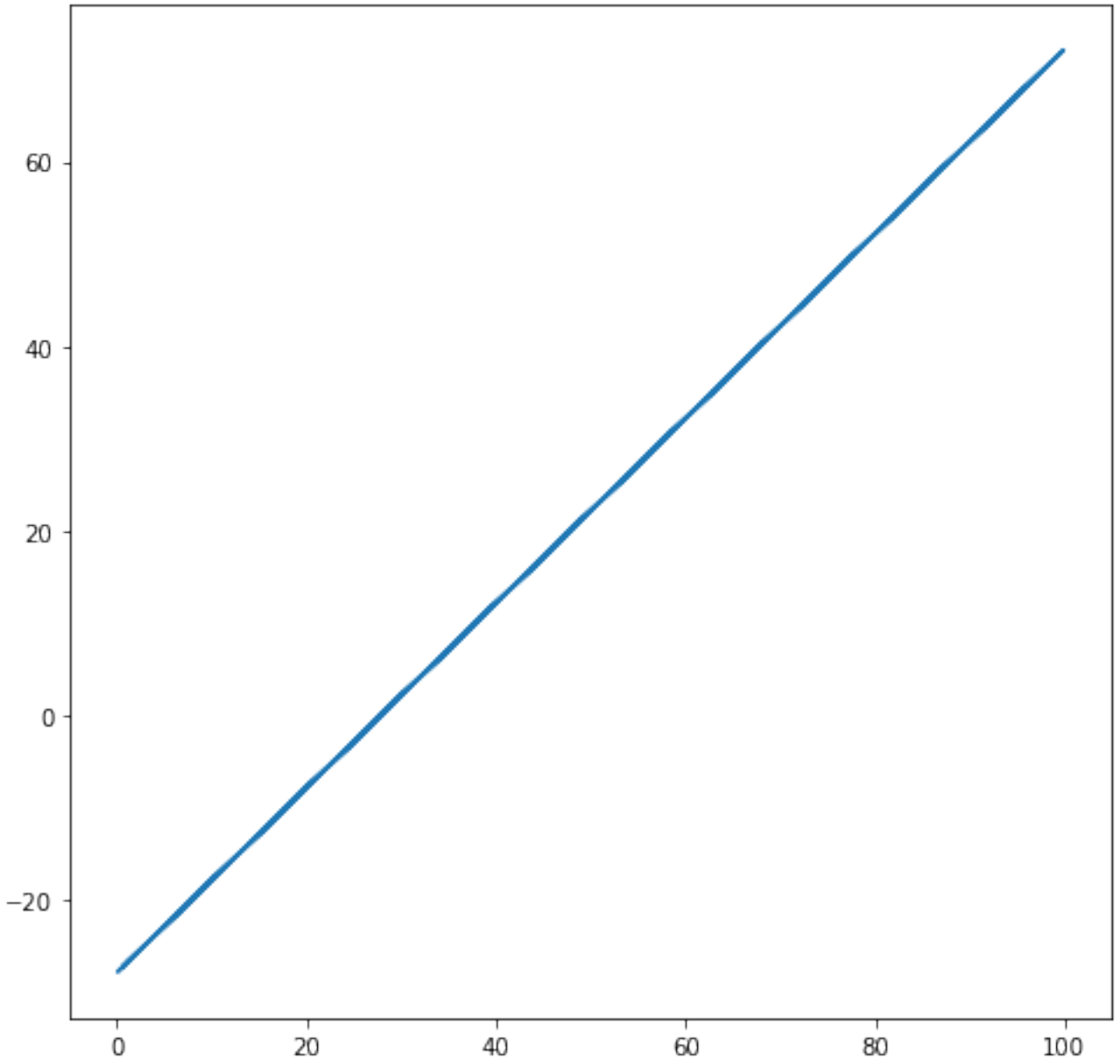
```
[  1.         -27.80229502]
```

In [59]:
```
colors = ListedColormap(['red', 'yellow'])

pyplot.figure(figsize(8, 8))
pyplot.plot(x, result_2.x[0] * x + result_2.x[1])
```

```
/home/valeriyasin/anaconda3/envs/python2/lib/python2.7/site-packages/ipykernel/__main__.py:4: VisibleDeprecationWarning: using a non-integer number instead of an integer will result in an error in the future
```

Out[59]:
```
[<matplotlib.lines.Line2D at 0x7fb014a03110>]
```



In [60]:
```
result_3 = minimize(lambda args: (abs(args[0] * x + args[1] - y)).sum(), [1., 0.],
                                    method='BFGS')
```

```
/home/valeriyasin/anaconda3/envs/python2/lib/python2.7/site-packages/ipykernel/__main__.py:1: VisibleDeprecationWarning: using a non-integer number instead of an integer will result in an error in the future
  if __name__ == '__main__':
```

и с MAE тоже все плохо

In [61]:
```
print result_3.x
```

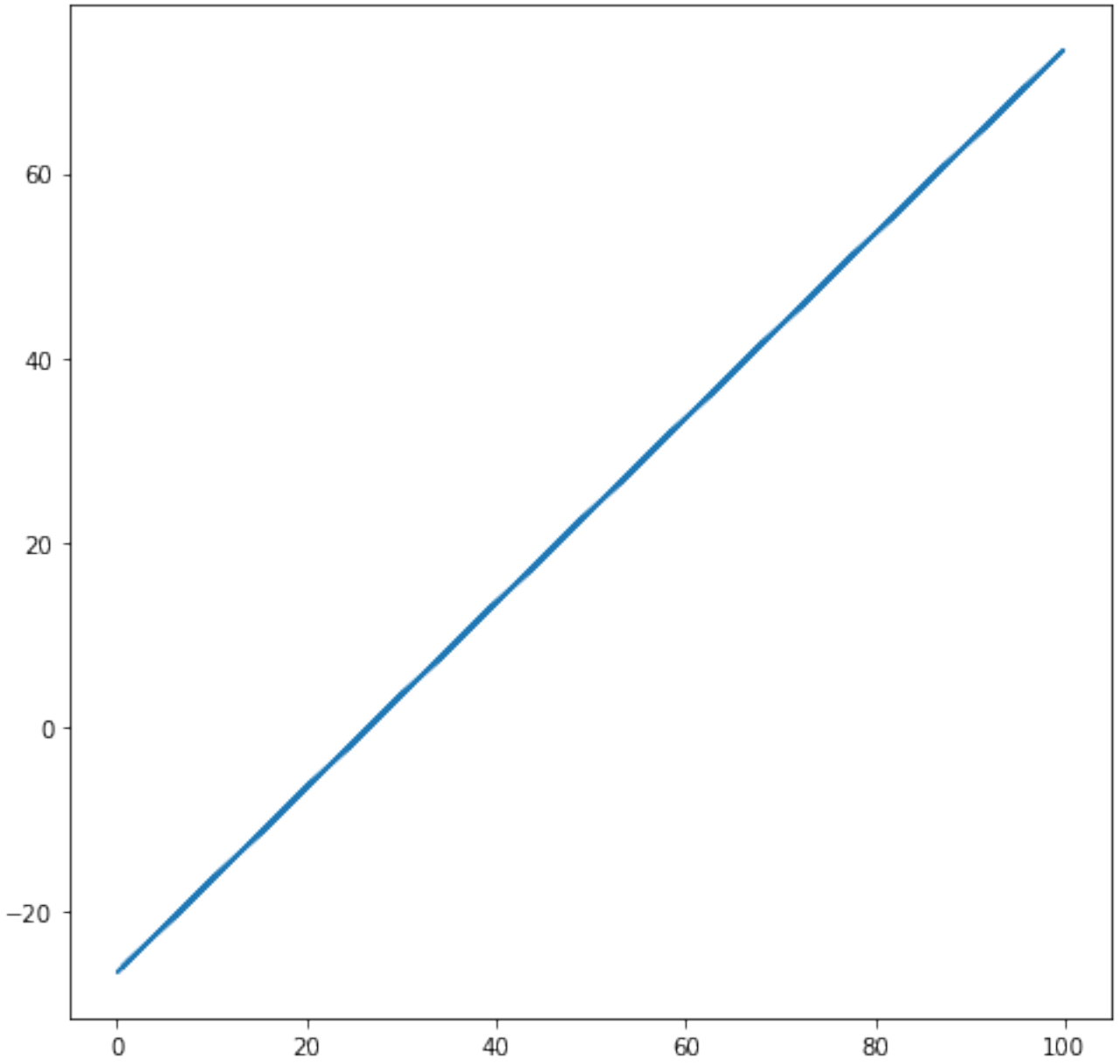
```
[  1.        -26.5430047]
```

In [63]:
```
colors = ListedColormap(['red', 'yellow'])

pyplot.figure(figsize(8, 8))
pyplot.plot(x, result_3.x[0] * x + result_3.x[1])
```

```
/home/valeriyasin/anaconda3/envs/python2/lib/python2.7/site-packages/ipykernel/__main__.py:4: VisibleDeprecationWarning: using a non-integer number instead of an integer will result in an error in the future
```

Out[63]:
```
[<matplotlib.lines.Line2D at 0x7fb014853e90>]
```



In [ ]: