In [64]:

```
import pandas as pd
import matplotlib.pyplot as plt
from IPython.display import display
```

Question 1

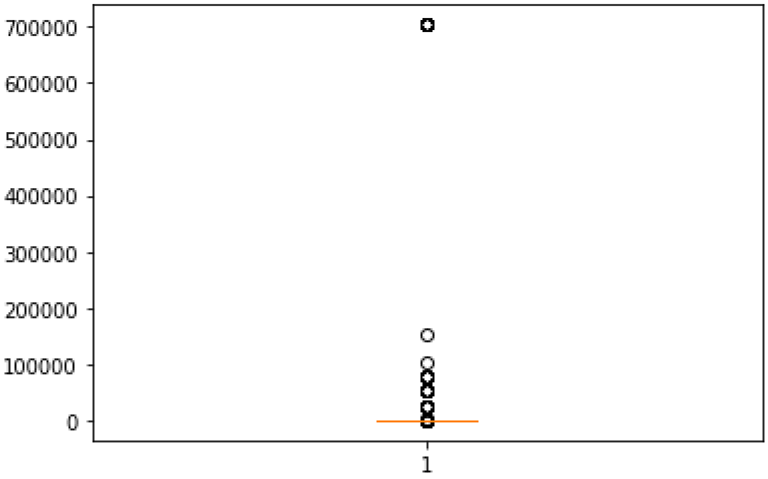
On Shopify, we have exactly 100 sneaker shops, and each of these shops sells only one model of shoe. We want to do some analysis of the average order value (AOV). When we look at orders data over a 30 day window, we naively calculate an AOV of $3145.13. Given that we know these shops are selling sneakers, a relatively affordable item, something seems wrong with our analysis.

a. Think about what could be going wrong with our calculation. Think of a better way to evaluate this data.
b. What metric would you report for this dataset?
c. What is its value?

In [83]:

```
df = pd.read_csv("2019 Winter Data Science Intern Challenge Data Set.csv")
display(df[['order_amount']].describe())
plt.boxplot(df[['order_amount']]);
```

	order_amount
count	5000.000000
mean	3145.128000
std	41282.539349
min	90.000000
25%	163.000000
50%	284.000000
75%	390.000000
max	704000.000000



A display of the different percentiles of order amounts shows a massive outlier, where an order amount equals $704,000. This is likely what's inflating the AOV to \$3,145.13, as arithmetic averages are sensitive to outliers.

In [88]:

```
df.sort_values("order_amount", ascending = False).head(20)
```

Out[88]:

	order_id	shop_id	user_id	order_amount	total_items	payment_method	created_at

	order_id	shop_id	user_id	order_amount	total_items	payment_method	created_at
2153	2154	42	607	704000	2000	credit_card	2017-03-12 4:00:00
3332	3333	42	607	704000	2000	credit_card	2017-03-24 4:00:00
520	521	42	607	704000	2000	credit_card	2017-03-02 4:00:00
1602	1603	42	607	704000	2000	credit_card	2017-03-17 4:00:00
60	61	42	607	704000	2000	credit_card	2017-03-04 4:00:00
2835	2836	42	607	704000	2000	credit_card	2017-03-28 4:00:00
4646	4647	42	607	704000	2000	credit_card	2017-03-02 4:00:00
2297	2298	42	607	704000	2000	credit_card	2017-03-07 4:00:00
1436	1437	42	607	704000	2000	credit_card	2017-03-11 4:00:00
4882	4883	42	607	704000	2000	credit_card	2017-03-25 4:00:00
4056	4057	42	607	704000	2000	credit_card	2017-03-28 4:00:00
15	16	42	607	704000	2000	credit_card	2017-03-07 4:00:00
1104	1105	42	607	704000	2000	credit_card	2017-03-24 4:00:00
1562	1563	42	607	704000	2000	credit_card	2017-03-19 4:00:00
2969	2970	42	607	704000	2000	credit_card	2017-03-28 4:00:00
4868	4869	42	607	704000	2000	credit_card	2017-03-22 4:00:00
1362	1363	42	607	704000	2000	credit_card	2017-03-15 4:00:00
691	692	78	878	154350	6	debit	2017-03-27 22:51:43
2492	2493	78	834	102900	4	debit	2017-03-04 4:37:34
3724	3725	78	766	77175	3	credit_card	2017-03-16 14:13:26

Displaying the top 20 most expensive orders reveals there is a recurring transaction between shop_id 42 and user_id 607, where 2000 items are being purchased at a time, always at 4pm. This sometimes happens multiple times a day. Were I an analyst with your company, I would recommend the shop and customer should be investigated for fraudulent or erroneous activity. Regardless of the nature of these orders, they are unusually high in value and are inflate the average order value so that it no longer represents the typical buyer.

For a representative figure, I would instead report the median order amount, which is much less sensitive to outliers like the recurring 2000 item purchases.

The median order value (MOV) is $284

Question 2:

For this question you’ll need to use SQL. Follow this link to access the data set required for the challenge. Please use queries to answer the following questions. Paste your queries along with your final numerical answers below.

a. How many orders were shipped by Speedy Express in total?

```
SELECT COUNT(*)
FROM Orders
WHERE ShipperID = 1;
```

Result: 54

b. What is the last name of the employee with the most orders?

```
SELECT TOP 1 LastName, OrderCount
FROM Employees
LEFT JOIN (SELECT EmployeeID, COUNT(*) AS OrderCount FROM Orders
GROUP BY EmployeeID) AS OrderCount
ON Employees.EmployeeID = OrderCount.EmployeeID
ORDER BY OrderCount DESC;
```

Result: Peacock – 40 Orders

c. What product was ordered the most by customers in Germany?

```
SELECT TOP 1 ProductName, Sum(Quantity) AS TotalOrderedInGermany
FROM Products
INNER JOIN (SELECT ProductID, Quantity
            FROM OrderDetails
INNER JOIN (SELECT OrderID
            FROM Orders
INNER JOIN (SELECT CustomerID
            FROM Customers
            WHERE Country = 'Germany')
AS GermanCustomerID ON Orders.CustomerID = GermanCustomerID.CustomerID)
AS GermanOrders ON OrderDetails.OrderID = GermanOrders.OrderID)
AS GermanOrderDetails ON Products.ProductID = GermanOrderDetails.ProductID
GROUP BY ProductName
ORDER BY Sum(Quantity) DESC;
```

Result: Boston Crab Meat – 160 Ordered