

# Student Information

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## Answer 1

a)

Probabilty I calculated through matlab: 0.1131. Which is relatively a low probabilty.

b)

I calculated the expected weight as given in the book, by taking the mean of values in the array. And I found that the expected value is 260069.5635 which is actually less than 300000. So it actually correlates with the probabilty I found in part-a.

c)

I calculated the standard deviation as given in the book, by taking the std of values in the array. And I found that the standard deviation is 33129.0416. My expected value is actually 39930.4365 tons behind the 300000 tons. Also  $39930.4365 > 33129.0416$ . Which then explains why the calculated probability I found in part-a is so small. This means, my estimator has high accuracy.

## Related Documents

Codes:

```
%initial_data
alpha_01=2.326; %this is the value that I got from the chapter-9 in
               the book
number_montecarlo=ceil(0.25*(alpha_01/0.03)^2);

number_greater=0;

total_weight_array=zeros(number_montecarlo,1);
for loop_1=1:number_montecarlo
total_weight=0;

%bulk carrier
total_bulk_weight=0;
```

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lambda_bulk = 50;
bulk_U = rand;
i_1 = 0;
F_1 = exp(-lambda_bulk);
while (bulk_U >= F_1);
i_1 = i_1 + 1;
F_1 = F_1 + exp(-lambda_bulk)* lambda_bulk^i_1/gamma(i_1+1);

end;
bulk_ship_amount=i_1;
for j=1:bulk_ship_amount
intermediate_1=sum( (-10) * log(rand(60,1))));
total_bulk_weight=total_bulk_weight+intermediate_1;
end

%container ship
total_container_weight=0;
lambda_container = 40;
container_U = rand;
i_2 = 0;
F_2 = exp(-lambda_container);
while (container_U >= F_2);
i_2 = i_2 + 1;
F_2 = F_2 + exp(-lambda_container)* lambda_container^i_2/gamma(i_2
+1);

end;
container_ship_amount=i_2;
for j=1:container_ship_amount
intermediate_2=sum( (-20) * log(rand(100,1))));
total_container_weight=total_container_weight+intermediate_2;
end

%oil tanker
total_oil_weight=0;
lambda_oil = 25;
U_oil = rand;
i_3 = 0;
F_3 = exp(-lambda_oil);
while (U_oil >= F_3);
i_3 = i_3 + 1;
F_3 = F_3 + exp(-lambda_oil)* lambda_oil^i_3/gamma(i_3+1);

```

```

end;
oil_ship_amount=i_3;
for j=1:oil_ship_amount
intermediate_3=sum( (-50) * log(rand(120,1)) );
total_oil_weight=total_oil_weight+intermediate_3;
end

%comparing results
total_weight=total_oil_weight+total_bulk_weight+
    total_container_weight;
total_weight_array(loop_1)=total_weight;
if total_weight>300000
number_greater=number_greater+1;
end
end

%calculating the required results
expectation = mean(total_weight_array);
deviation = std(total_weight_array);
ratio_1=number_greater/number_montecarlo;
fprintf('Probability: %.4f\n', ratio_1);
fprintf('Expected value: %.4f\n', expectation);
fprintf('Standard Deviation: %.4f\n', deviation);

```

Screenshot:

Command Window	Workspace																																																																		
<pre> F_3 = exp(-lambda_oil); while (U_oil &gt;= F_3); i_3 = i_3 + 1; F_3 = F_3 + exp(-lambda_oil)* lambda_oil^i_3/gamma(i_3+1);  end; oil_ship_amount=i_3; for j=1:oil_ship_amount intermediate_3=sum( (-50) * log(rand(120,1)) ); total_oil_weight=total_oil_weight+intermediate_3; end  %comparing results total_weight=total_oil_weight+total_bulk_weight+total_container_weight; total_weight_array(loop_1)=total_weight; if total_weight&gt;300000 number_greater=number_greater+1; end end  %calculating the required results expectation = mean(total_weight_array); deviation = std(total_weight_array); ratio_1=number_greater/number_montecarlo; fprintf('Probability: %.4f\n', ratio_1); fprintf('Expected value: %.4f\n', expectation); fprintf('Standard Deviation: %.4f\n', deviation); Probability: 0.1131 Expected value: 260069.5635 Standard Deviation: 33129.0416 fx&gt;&gt; </pre>	<table> <thead> <tr> <th>Name</th><th>Value</th></tr> </thead> <tbody> <tr><td>U_oil</td><td>0.8157</td></tr> <tr><td>total_weight_array</td><td>1503x1 double</td></tr> <tr><td>total_weight</td><td>2.7734e+05</td></tr> <tr><td>total_oil_weight</td><td>1.7471e+05</td></tr> <tr><td>total_container_weight</td><td>7.0274e+04</td></tr> <tr><td>total_bulk_weight</td><td>3.2359e+04</td></tr> <tr><td>ratio_1</td><td>0.1131</td></tr> <tr><td>ratio</td><td>0.0193</td></tr> <tr><td>oil_ship_amount</td><td>29</td></tr> <tr><td>number_montecarlo</td><td>1503</td></tr> <tr><td>number_greater</td><td>170</td></tr> <tr><td>loop_1</td><td>1503</td></tr> <tr><td>lambda_oil</td><td>25</td></tr> <tr><td>lambda_container</td><td>40</td></tr> <tr><td>lambda_bulk</td><td>50</td></tr> <tr><td>j</td><td>29</td></tr> <tr><td>intermediate_3</td><td>6.5909e+03</td></tr> <tr><td>intermediate_2</td><td>2.3068e+03</td></tr> <tr><td>intermediate_1</td><td>537.8653</td></tr> <tr><td>i_3</td><td>29</td></tr> <tr><td>i_2</td><td>35</td></tr> <tr><td>i_1</td><td>53</td></tr> <tr><td>F_3</td><td>0.8179</td></tr> <tr><td>F_2</td><td>0.2424</td></tr> <tr><td>F_1</td><td>0.6959</td></tr> <tr><td>expectation</td><td>2.6007e+05</td></tr> <tr><td>deviation</td><td>3.3129e+04</td></tr> <tr><td>container_U</td><td>0.2032</td></tr> <tr><td>container_ship_amount</td><td>35</td></tr> <tr><td>bulk_U</td><td>0.6756</td></tr> <tr><td>bulk_ship_amount</td><td>53</td></tr> <tr><td>alpha_01</td><td>2.3260</td></tr> </tbody> </table>	Name	Value	U_oil	0.8157	total_weight_array	1503x1 double	total_weight	2.7734e+05	total_oil_weight	1.7471e+05	total_container_weight	7.0274e+04	total_bulk_weight	3.2359e+04	ratio_1	0.1131	ratio	0.0193	oil_ship_amount	29	number_montecarlo	1503	number_greater	170	loop_1	1503	lambda_oil	25	lambda_container	40	lambda_bulk	50	j	29	intermediate_3	6.5909e+03	intermediate_2	2.3068e+03	intermediate_1	537.8653	i_3	29	i_2	35	i_1	53	F_3	0.8179	F_2	0.2424	F_1	0.6959	expectation	2.6007e+05	deviation	3.3129e+04	container_U	0.2032	container_ship_amount	35	bulk_U	0.6756	bulk_ship_amount	53	alpha_01	2.3260
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