

Minor edits to Webwork problems

It is often required to update or correct minor errors in previously used Webwork problems. This will give a couple of examples to show how this can be done by instructors or TAs who use Webwork and have professor permissions.

Get to the Webwork Hmwk Sets Editor page either via Moodle or direct access if you the instructor. The page should look like

	Set List						
<input type="checkbox"/>	Edit Set Data	Edit Problems	Edit Assigned Users	Visible	Open Date	Close Date	Answer Date
<input type="checkbox"/>	Chapter 3	3	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 4	10	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 5	8	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm

In the problem sets list, click (or right click and select open in new tab) on the number in the Edit Problems column of the Problem set you wish to edit. In this case, ece514_hw05_fall2020

<input type="checkbox"/>	ECE514 HW 13 geb fall2019	11	1/44	No	11/25/2019 at 07:30pm	12/06/2019 at 04:00pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	ECE514 HW 01 geb fall2020	10	1/44	No	08/12/2020 at 09:00am	08/18/2020 at 11:59pm	08/20/2020 at 01:00am
<input type="checkbox"/>	ece514 hw01 fall2020	10	41/44	Yes	08/12/2020 at 09:00am	08/25/2020 at 11:59pm	08/25/2020 at 11:59pm
<input type="checkbox"/>	ece514 hw02 fall2020	10	41/44	Yes	08/18/2020 at 11:30am	08/25/2020 at 11:59pm	08/26/2020 at 11:59pm
<input type="checkbox"/>	MAAtutorial fall2020	16	41/44	Yes	08/10/2020 at 06:00am	08/31/2020 at 06:00am	01/01/2021 at 01:42pm
<input type="checkbox"/>	Orientation fall2020	15	41/44	Yes	08/10/2020 at 07:55am	08/31/2020 at 07:55am	01/01/2021 at 01:42pm
<input type="checkbox"/>	ece514 hw03 fall2020	9	44/44	Yes	08/20/2020 at 03:30pm	09/03/2020 at 11:59pm	09/04/2020 at 11:59pm
<input type="checkbox"/>	ece514 hw04 fall2020	7	44/44	Yes	08/31/2020 at 08:30am	09/15/2020 at 11:59pm	09/16/2020 at 10:59pm
<input type="checkbox"/>	ece514 hw05 fall2020	8	2/44	No	09/04/2020 at 11:14am	09/22/2020 at 11:57pm	09/23/2020 at 11:59pm
<input type="checkbox"/>	Webwork practice 1	5	1/44	No	11/15/2021 at 09:07am	11/22/2021 at 09:07am	11/22/2021 at 09:07am
<input type="checkbox"/>	Probability problems	25	1/44	No	07/06/2024 at 09:39pm	07/13/2024 at 09:39pm	07/13/2024 at 09:39pm
<input type="checkbox"/>	joel test	38	1/44	No	04/02/2022 at 11:22am	12/31/2025 at 11:22am	12/31/2025 at 11:22am
<input type="checkbox"/>	Probability 514	0	1/44	No	04/22/2026 at 09:39pm	04/29/2026 at 09:39pm	05/01/2026 at 09:39pm

Please select action to be performed.

This takes you to the details for the problem set page.

Courses
Homework Sets
ece514_hw05_fall2020
User Settings
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Hmwk Sets Editor
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Set Detail 2 for set ece514_hw05_fall2020

This set ece514_hw05_fall2020 is assigned to 2 students out of 44. [Edit individual versions](#) of set ece514_hw05_fall2020.

Any changes made below will be reflected in the set for ALL students.

[Save Changes](#) [Reset Form](#)

General Information	
Opens	09/04/2020 at 11:14am
Closes	09/22/2020 at 11:57pm
Answers Available	09/23/2020 at 11:59pm
Visible to Students	No
Hide Hints from Students	No
Assignment type	homework

Set Description




Headers	Data
Set Header	defaultHeader Use Default Header File
Hardcopy Header	defaultHeader Use Default Header File

Problems

Renumber Problems [Render All](#) Hide All Display Mode: images

1	Weight	14	Source File	local/ECE514/Papoulis_4ed_Chapter_5/Papoulis_4ec
<input type="checkbox"/>	Delete it?	Max attempts	7	
<input type="checkbox"/>	Mark Correct?			

I recommend rendering all the problems so you can see the actual problems in the set, not just the source file name. In any case, the next step is to go to the problem editor. In the problem of interest, click on the “edit” icon (again, I prefer to use right click and select open in new tab)

2   

Delete it? Mark Correct?

Weight 16 Max attempts 10

Source File local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ec

(16 points) local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ed_Chapter_6_6.1.pg
 $f_x(x) = e^{-x}U(x)$ and $f_y(y) = e^{-y}U(y)$. Find the p.d.f of the random variable z , if:

a) $z = x + y$, $f_z(z) =$ U(z) help (numbers)
b) $z = x - y$, $f_z(z) =$ for $-\infty \leq z \leq \infty$ help (numbers)
c) $z = \frac{x}{y}$, $f_z(z) =$ U(z) help (numbers)
d) $z = \min(x, y)$, $f_z(z) =$ U(z) help (numbers)
e) $z = \max(x, y)$, $f_z(z) =$ U(z) help (numbers)
f) $z = \frac{\min(x,y)}{\max(x,y)}$, $f_z(z) =$ for $\leq z \leq$ help (numbers)

[Solution:](#)

In this case, we want to edit the solution. Clicking on the “Solution:” link, expands the solution.

2 ↓


 Delete it?

 Mark Correct?

Weight 16

Max attempts 10

Source File local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ec

(16 points) local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ed_Chapter_6_6.1.pg

X and Y are independent and identically distributed (i.i.d) random variables with common p.d.f $f_x(x) = e^{-x}U(x)$ and $f_y(y) = e^{-y}U(y)$. Find the p.d.f of the random variable z , if:

a) $z = x + y, f_z(z) = \text{[input]} U(z)$ help (numbers)

b) $z = x - y, f_z(z) = \text{[input]}$ for $-\infty \leq z \leq \infty$ help (numbers)

c) $z = \frac{x}{y}, f_z(z) = \text{[input]} U(z)$ help (numbers)

d) $z = \min(x, y), f_z(z) = \text{[input]} U(z)$ help (numbers)

e) $z = \max(x, y), f_z(z) = \text{[input]} U(z)$ help (numbers)

f) $z = \frac{\min(x, y)}{\max(x, y)}, f_z(z) = \text{[input]}$ for $\text{[input]} \leq z \leq \text{[input]}$ help (numbers)

Solution:*(Instructor solution preview: show the student solution after due date.)***SOLUTION**

a) Define $z = x + y$. We know the pdf of the sum of two random variables is the convolution of the pdfs of the random variables:

$$f_z(z) = \int_{-\infty}^{\infty} f_x(z-y)f_y(y)dy = \int_{-\infty}^{\infty} e^{-(z-y)}U(z-y)e^{-y}U(y)dy$$

We note that $U(z-y) = 0$ for $z < y$ and $U(y) = 0$ for $y < 0$, this means the limits of integration on y are $[0, z]$

$$\text{so, for } z \geq 0, \text{ we have } f_z(z) = \int_0^z e^{-z}dy = ze^{-z}$$

$$\text{and for } z < 0, \text{ we have } f_z(z) = 0$$

$$\text{or } f_z(z) = ze^{-z}U(z)$$

b) $z = x - y$

z ranges over entire real axis for RV's x and y . For equation 6.55 in textbook, we have:

$$F_z(z) = \int_0^{\infty} \int_0^{z+y} f_{xy}(x, y)dx dy, \text{ for } z \geq 0 \text{ and } F_z(z) = \int_{-z}^{\infty} \int_0^{z+y} f_{xy}(x, y)dx dy, \text{ for } z < 0$$

$$\text{Differentiation gives: } f_z(z) = \int_0^{\infty} f_{xy}(z+y, y)dy, \text{ for } z \geq 0 \text{ and}$$

$$f_z(z) = \int_{-z}^{\infty} f_{xy}(z+y, y)dy, \text{ for } z < 0$$

$$f_z(z) = \int_0^{\infty} e^{-(z+y+y)}dy, \text{ for } z \geq 0 \text{ and } f_z(z) = \int_{-z}^{\infty} e^{-(z-y+y)}dy, \text{ for } z < 0$$

$$f_z(z) = \frac{1}{2}e^{-z}, \text{ for } z \geq 0 \text{ and } f_z(z) = \frac{1}{2}e^z, \text{ for } z < 0$$

$$\text{Thus } f_z(z) = \frac{1}{2}e^{-|z|}, \text{ for } -\infty < z < \infty.$$

c) $z = x/y$

$$F_z(z) = P(z < z) = P(x/y < z) = P(x < yz) \text{ for } z \geq 0$$

This defines the region in the x - y plane described by

Now, click the edit icon, this takes you to the edit page

Problem 2

Editing set ece514_hw05_fall2020/problem 2 in file '[TMPL]/local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ed_Chapter_6_6.1.pg'

Problem Techniques Math Objects POD PGLab PGML Author Info Report Bugs in this Problem

```
1 ## DESCRIPTION
2 # Problem for 'NCSU ECE514 Krim'.
3 # WeBWork problem written by H. J. Trussell, <hjt@ncsu.edu>
4 # ENDDescription
5 ## DBsubject(Electrical Engineering)
6 ## DBchapter(CHAPTER 6)
7 ## DBsection(NA)
8 ## Institution(North Carolina State University)
9 ## Autho(H. J. Trussell)
10 ## TitleText1('Probability, Random Variables and Stochastic Processes')
11 ## AuthorText1('Athanasios Papoulis', 'S. Umnikrishna Pillai')
12 ## EditionText1('4')
13 ## Problem1('6.1')
14 ## Keywords('function of random variable')
15 ## Resources()
16
17 DOCUMENT ();
18
19 loadMacros("PG.pl",
20           "PGbasicmacros.pl",
```

View Update NewVersion Append

Using what seed?: 1318

Using what display mode?: MathJax

Open in new window

Take Action!

We need to change in the problem solution, "sum of two random variables" should be "sum of two independent random variables"

Scroll down to the Solution and type in the word "independent" in the proper place.

Problem 2

Editing set ece514_hw05_fall2020/problem 2 in file [TMPL]/local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ed_Chapter_6

Problem Techniques Math Objects POD PGLab PGML Author Info Report Bugs in this Problem

```
76 #####
77 # Solution
78
79 Context()->texStrings;
80 BEGIN_SOLUTION;
81 $PAR
82 $BBOLD SOLUTION $EBOLD
83 $PAR
84 a) Define  $( z = x + y )$ . We know the pdf of the sum of two independent
      random variables is the convolution of the pdfs of the random variables: $BR
85  $( f_z(z) = \int_{-\infty}^{\infty} f_x(z-y)f_y(y) dy = \int_{-\infty}^{\infty} e^{-(z-y)}U(z-y)e^{-y}U(y)dy )$  $PAR
86 We note that  $( U(z-y) = 0 )$  for  $( z < y )$  and  $( U(y) = 0 )$  for  $( y < 0 )$ ,
      this means the limits of integration on  $( y )$  are  $( [0, z] )$  $BR
87 so, for  $( z \geq 0 )$ , we have  $( f_z(z) = \int_0^z e^{-z} dy = ze^{-z} )$  $BR
88 and for  $( z < 0 )$ , we have  $( f_z(z) = 0 )$  $PAR
89 or  $( f_z(z) = ze^{-z}U(z) )$  $PAR
90
91 b)  $( z = x - y )$  $BR
```

View Update NewVersion Append

The next edit in part c is to capitalize Z in subscript of F ($F_Z(z)$) and in $P(Z \leq z)$, also, would like to change all $<$ signs to \leq signs

So scroll down to the proper place and make changes by simple delete and retype, or typing over selections

Original perl code

Problem 2

Editing set ece514_hw05_fall2020/problem 2 in file '[TMPL]/local/ECE514/Papoulis_4ed_Chapter_6/Papoulis_4ed_Chapter_6_6.1.pg'

Problem Techniques

Math Objects

POD

PGLab

PGML

Author Info

Report Bugs in this Problem

```
99
100 c) \(\ z = x/y \) $BR
101 \(\ F_z(z) = P(\underline{z} < \underline{z}) = P(x/y < z) = P(x < yz) \) for \(\ z \geq 0 \) $BR
102 This defines the region in the x-y plane described by $BR
103 $PAR
104 \{\ image( "Papoulis_6_6-1_fig.png" , width=>300, height=>300, ) \}
105 $PAR
106 and the integral, \(\ F_z(z) = \int_{-\infty}^{\infty} \int_0^{zy}
e^{-x}U(x)e^{-y}U(y) dx dy \) $BR
107 \(\ = \int_{y=0}^{\infty} e^{-y} \int_{x=0}^{zy} e^{-x} dx dy \) $BR
108 \(\ = \int_{y=0}^{\infty} e^{-y} [ -e^{-x} ]_0^{zy} dy = \int_{y=0}^{\infty}
e^{-y} [ 1 - e^{-zy} ] dy \) $BR
109 \(\ = \int_{y=0}^{\infty} e^{-y} dy - \int_{y=0}^{\infty} e^{-(1-z)y} dy = -
e^{-y} ]_0^{\infty} + \frac{1}{1+z} e^{-(1+z)y} ]_0^{\infty} \) $BR
110 \(\ = -0 + 1 + \frac{1}{1+z} [0-1] = (1 - \frac{1}{1+z})U(z) \) $BR
111 now, we differentiate to find the pdf $BR
112 \(\ f_z(z) = \frac{d}{dz} F_z(z) = \frac{d}{dz} (1 - \frac{1}{1+z})U(z) \) $BR
113 \(\ f_z(z) = \frac{1}{(1+z)^2}U(z) \) $BR
114
115 $PAR
```

Edited Perl code

```

99
100 c) \(\ z = x/y \) $BR
101 \(\ F_Z(z) = P(\underline{Z} \geq z) = P(\underline{x/y} \geq z) = P(\underline{x} \geq yz) \) for \(\underline{z} \geq
0\) $BR
102 This defines the region in the x-y plane described by $BR
103 $PAR
104 \{ image( "Papoulis_6_6-1_fig.png" , width=>300, height=>300, ) \}
105 $PAR
106 and the integral, \(\underline{F_Z}(z) = \int_{-\infty}^{\infty} \int_{0}^{zy}
e^{-x}U(x)e^{-y}U(y) dx dy \) $BR
107 \(\ = \int_{y=0}^{\infty} e^{-y} \int_{x=0}^{zy} e^{-x} dx dy \) $BR
108 \(\ = \int_{y=0}^{\infty} e^{-y} [ -e^{-x} ]_0^{zy} dy = \int_{y=0}^{\infty}
e^{-y} [ 1 - e^{-zy} ] dy \) $BR
109 \(\ = \int_{y=0}^{\infty} e^{-y} dy - \int_{y=0}^{\infty} e^{-(1-z)y} dy = -
e^{-y} ]_0^{\infty} + \frac{1}{1+z} e^{-(1+z)y} ]_0^{\infty} \) $BR
110 \(\ = -0 + 1 + \frac{1}{1+z} [ 0 - 1 ] = ( 1 - \frac{1}{1+z} ) U(z) \) $BR
111 now, we differentiate to find the pdf $BR
112 \(\underline{f}_z(z) = \frac{d}{dz} \underline{F_Z}(z) = \frac{d}{dz} ( 1 - \frac{1}{1+z} ) U(z) \) $BR
113 \(\underline{f}_z(z) = \frac{1}{(1+z)^2} U(z) \) $BR
114

```

[View](#)
[Update](#)
[NewVersion](#)
[Append](#)

Using what seed?:

Using what display mode?:

Open in new window

[Take Action!](#)

We are ready to save the edits. Click on the "Update" tab and then click "Take Action"

This will display the updated problem in a new tab. Since the edits were in the solution, we need to click on "Solution:" to expose the edited solution

- c) $z = \frac{x}{y}$, $f_z(z) =$ $U(z)$ help (numbers)
- d) $z = \min(x, y)$, $f_z(z) =$ $U(z)$ help (numbers)
- e) $z = \max(x, y)$, $f_z(z) =$ $U(z)$ help (numbers)
- f) $z = \frac{\min(x,y)}{\max(x,y)}$, $f_z(z) =$ for $\leq z \leq$ help (numbers)

Solution:

(Instructor solution preview: show the student solution after due date.)

SOLUTION

a) Define $z = x + y$. We know the pdf of the sum of two independent random variables is the convolution of the pdfs of the random variables:

$$f_z(z) = \int_{-\infty}^{\infty} f_x(z-y)f_y(y)dy = \int_{-\infty}^{\infty} e^{-(z-y)}U(z-y)e^{-y}U(y)dy$$

We note that $U(z-y) = 0$ for $z < y$ and $U(y) = 0$ for $y < 0$, this means the limits of integration on y are $[0, z]$

so, for $z \geq 0$, we have $f_z(z) = \int_0^z e^{-z}dy = ze^{-z}$

and for $z < 0$, we have $f_z(z) = 0$

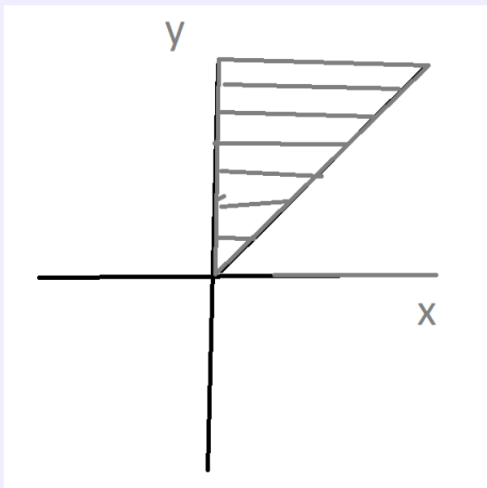
or $f_z(z) = ze^{-z}U(z)$

And

c) $z = x/y$

$F_Z(z) = P(\underline{Z} \geq z) = P(x/y \geq z) = P(x \geq yz)$ for $z \geq 0$

This defines the region in the x-y plane described by



and the integral, $F_Z(z) = \int_{-\infty}^{\infty} \int_0^{zy} e^{-x}U(x)e^{-y}U(y)dx dy$

$$= \int_{y=0}^{\infty} e^{-y} \int_{x=0}^{zy} e^{-x} dx dy$$

$$= \int_{y=0}^{\infty} e^{-y} [-e^{-x}]_0^{zy} dy = \int_{y=0}^{\infty} e^{-y} [1 - e^{-zy}] dy$$

$$= \int_{y=0}^{\infty} e^{-y} dy - \int_{y=0}^{\infty} e^{(1-z)y} dy = -e^{-y}|_0^{\infty} + \frac{1}{1+z} e^{-(1+z)y}|_0^{\infty}$$

$$= -0 + 1 + \frac{1}{1+z} [0 - 1] = (1 - \frac{1}{1+z})U(z)$$

now, we differentiate to find the pdf

$$f_z(z) = \frac{d}{dz} F_Z(z) = \frac{d}{dz} (1 - \frac{1}{1+z})U(z)$$

$$f_z(z) = \frac{1}{(1+z)^2} U(z)$$

The problem is now ready for the students. However, there is one more step that needs to be done to save to the new file to Webwork archives. Go back to the Webwork Hmwk Sets Editor page and click the "Export" tab.

Hmwk Sets Editor

Please select action to be performed.

Show/Hide Site Description

Select an action to perform:

Filter Sort Edit Publish Import **Export** Score Create Delete

Show which sets?: enter matching set IDs below

Match on what? (separate multiple IDs with commas):

Take Action!

Showing 46 out of 46 sets.

Set List

<input type="checkbox"/>	Edit Set Data	Edit Problems	Edit Assigned Users	Visible	Open Date	Close Date	Answer Date
<input type="checkbox"/>	Chapter 3	3	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 4	10	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 5	8	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 6	8	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm
<input type="checkbox"/>	Chapter 7	1	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm

Verify that Export which sets? Is set to visible sets. Than click "take action." This will show that Webwork is setting to export visible sets – note the green line

Hmwk Sets Editor

Results of last action performed:
exporting visible sets

Show/Hide Site Description

Select an action to perform:

Save Export





Cancel Export

Export selected sets

Take Action!

Showing 46 out of 46 sets.

Set List

	Edit Set Data	Edit Problems	Edit Assigned Users
<input checked="" type="checkbox"/>	Chapter 3 	3	1/44
<input checked="" type="checkbox"/>	Chapter 4 	10	1/44
<input checked="" type="checkbox"/>	Chapter 5 	8	1/44
<input checked="" type="checkbox"/>	Chapter 6 	8	1/44

You need to click “Take Action” one more time to complete the export operation! This updates the *.def files in the Webwork archive. Do not omit this action! You may lose your edits, not for this semester but for the next semester, if you create a new archive without completing the export. This gives

Hmwk Sets Editor

Results of last action performed:
46 sets exported, 0 sets skipped. Skipped sets:
()

Show/Hide Site Description

Select an action to perform:

- Filter
- Sort
- Edit
- Publish
- Import
- Export
- Score
- Create
- Delete

Show which sets?:

Match on what? (separate multiple IDs with commas)*:

Take Action!

Showing 46 out of 46 sets.

Set List							
<input type="checkbox"/>	Edit Set Data	Edit Problems	Edit Assigned Users	Visible	Open Date	Close Date	Answer Date
<input checked="" type="checkbox"/>	Chapter 3	3	1/44	No	06/02/2014 at 01:42pm	03/02/2018 at 01:42pm	01/01/2021 at 01:42pm