

**Lab 04**Name: [WebCT Administrator \(Preview\)](#)Start time: [October 27, 2003 11:46am](#) | Number of questions: 10[Finish](#)[Help](#)

This set of questions goes with the pages of applets and activities for [Lab 04](#). Use the applets and activities there to answer the questions.

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**Question 1 (1 point)**

Refer to lab pages 1 and 2. Notice that the figure at the top of "The Gutter Problem" page 1 is labeled in inches, but the Sketchpad figure on page 2 is calibrated in centimeters. How does the change in units affect the problem?

- ☐ a. Since the figure in inches and the figure in centimeters are similar, the same angle will give the maximum area in either case.
- ☐ b. The angle will have to be divided by 2.54
- ☐ c. The angle will have to be multiplied by 2.54
- ☐ d. Centimeters are useless because the gutter will be too small to hold water.

[Save answer](#)**Question 2 (1 point)**

Refer to lab page 2. What area does Sketchpad give for the angle size  $90^\circ$ ? Report the number, without units.

- ☐ a. Somewhere between 13.22 and 14.61
- ☐ b. Somewhere between 14.03 and 14.78
- ☐ c. Somewhere between 15.52 and 15.98
- ☐ d. Somewhere between 15.92 and 16.13
- ☐ e. Somewhere between 16.59 and 17.02

[Save answer](#)**Question 3 (1 point)**

Refer to lab page 2. What area does Sketchpad give for the angle size  $30^\circ$ ?

- ☐ a.  $12.26 < \text{area} < 12.74$
- ☐ b.  $13.42 < \text{area} < 14.04$
- ☐ c.  $14.73 < \text{area} < 15.13$
- ☐ d.  $15.24 < \text{area} < 15.78$
- ☐ e.  $15.78 < \text{area} < 16.06$

Save answer

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#### Question 4 (0 points)

Refer to lab page 2. What is the largest that angle BOA can be before the model breaks down ? (Hint: it is impossible for the gutter material to pass through itself.) Report the number of degrees.

Answer

Save answer

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#### Question 5 (1 point)

Refer to lab page 2. What is the cross sectional area of the gutter exactly if the angle  $x$  is  $30^\circ$ ? Note that the applet only gives an approximate value, so you need to do some trigonometry to get the exact value.

- ☐ a.  $4\sqrt{3} + 8$
- ☐ b.  $8\sqrt{3} + 4$
- ☐ c.  $7\sqrt{5}$
- ☐ d.  $7\sqrt{2} + 5$
- ☐ e.  $5\sqrt{2} + 7$

Save answer

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#### Question 6 (1 point)

Refer to lab page 2. What is the cross sectional area exactly if the the angle  $x$  is  $45^\circ$ ? You can't just read the answer from the applet--you need to draw some triangles to get the exact value.

- ☐ a.  $8\sqrt{2}+4$
- ☐ b.  $8\sqrt{2}+8$
- ☐ c.  $9\sqrt{3}+6$
- ☐ d. 16
- ☐ e.  $6\sqrt{3}+9$

Save answer

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### Question 7 (1 point)

Develop a formula that uses trigonometric functions to give the cross sectional area as a function of the angle  $x$ .

- ☐ a.  $16*\sin(x)*\cos(x)+16*\cos(x)$
- ☐ b.  $16*\sin(x)*\cos(x)+16*\sin(x)$
- ☐ c.  $16*\sin(x)*\cos(x)+8*\cos(x)$
- ☐ d.  $16*\sin(x)*\cos(x)+8*\sin(x)$
- ☐ e.  $8*\sin(x)*\cos(x)+16*\cos(x)$
- ☐ f.  $8*\sin(x)*\cos(x)+16*\sin(x)$

Save answer

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### Question 8 (1 point)

Refer to lab page 3. Use the graphing utility to plot the function you found in the previous question. What value of the angle  $x$  makes the area a maximum according to the graph of the function you found?

(Hint: Look for the smallest positive angle. The grapher reports the answer in radians, not degrees, so give your answer in radians.)

Answer

Save answer

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**Question 9 (1 point)**

What is the maximum cross sectional area of the gutter in square inches? Report the number to three decimal places, without units (Use the grapher on page 3: the number reported by Sketchpad is not accurate enough to answer this question.)

Answer

Save answer

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**Question 10 (2 points)**

Write a few sentences about limitations of this model for gutter design. Think of some factors the model does not take into account that could influence the design of the gutter, or some assumptions the model makes that are unnecessary or wrong-headed. (My grader or I will read your response to this question on WebCT "in person"--points will not show on your Lab score report today.)

Equation

Save answer

Finish

Help