

**Math 3A HW #8**

Answers must be submitted via Moodle before 9:30AM on Friday November 18th, 2016.

Good luck!

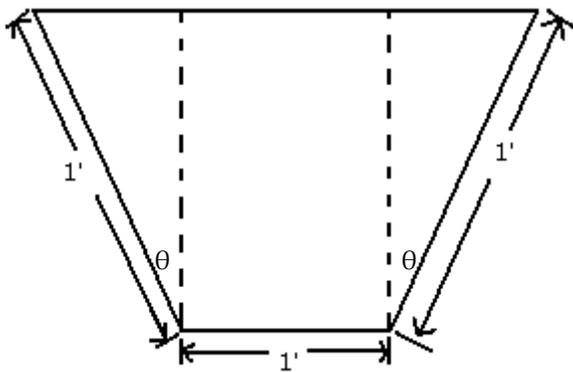
**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Solve the problem.**

- 1) A rectangular field is to be enclosed on four sides with a fence. Fencing costs \$5 per foot for two opposite sides, and \$2 per foot for the other two sides. Find the dimensions of the field of area 850 square feet that would be the cheapest to enclose. 1) \_\_\_\_\_

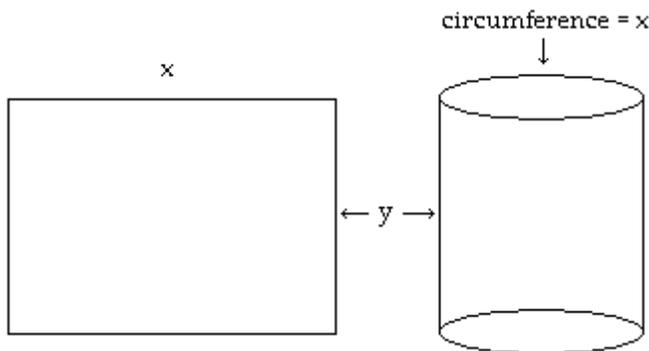
- A) 46.1 ft at \$5 by 18.4 ft at \$2                      B) 18.4 ft at \$5 by 46.1 ft at \$2  
 C) 11.7 ft at \$5 by 72.9 ft at \$2                      D) 72.9 ft at \$5 by 11.7 ft at \$2

- 2) A trough is to be made with an end of the dimensions shown. The length of the trough is to be 22 feet long. Only the angle  $\theta$  can be varied. What value of  $\theta$  will maximize the trough's volume? 2) \_\_\_\_\_



- A)  $8^\circ$                       B)  $32^\circ$                       C)  $30^\circ$                       D)  $52^\circ$

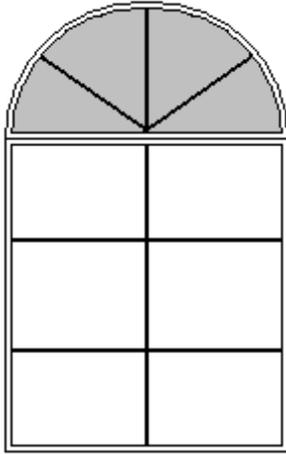
- 3) A rectangular sheet of perimeter 27 centimeters and dimensions  $x$  centimeters by  $y$  centimeters is to be rolled into a cylinder as shown in the figure. What values of  $x$  and  $y$  give the largest volume? 3) \_\_\_\_\_



- A)  $x = 9$  cm;  $y = \frac{9}{2}$  cm                      B)  $x = 8$  cm;  $y = \frac{11}{2}$  cm  
 C)  $x = 10$  cm;  $y = \frac{7}{2}$  cm                      D)  $x = 11$  cm;  $y = \frac{5}{2}$  cm

- 4) A window is in the form of a rectangle surmounted by a semicircle. The rectangle is of clear glass, whereas the semicircle is of tinted glass that transmits only one-third as much light per unit area as clear glass does. The total perimeter is fixed. Find the proportions of the window that will admit the most light. Neglect the thickness of the frame.

4) \_\_\_\_\_



A)  $\frac{\text{width}}{\text{height}} = \frac{12}{6 + \pi}$

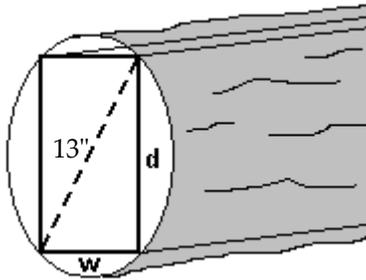
B)  $\frac{\text{width}}{\text{height}} = \frac{12}{3 + 2\pi}$

C)  $\frac{\text{width}}{\text{height}} = \frac{12}{6 + 2\pi}$

D)  $\frac{\text{width}}{\text{height}} = \frac{3}{6 + 2\pi}$

- 5) The strength  $S$  of a rectangular wooden beam is proportional to its width times the square of its depth. Find the dimensions of the strongest beam that can be cut from a 13-inch-diameter cylindrical log. (Round answers to the nearest tenth.)

5) \_\_\_\_\_



A)  $w = 8.5; d = 9.6$

B)  $w = 6.5; d = 11.6$

C)  $w = 8.5; d = 11.6$

D)  $w = 7.5; d = 10.6$

- 6) From a thin piece of cardboard 30 in. by 30 in., square corners are cut out so that the sides can be folded up to make a box. What dimensions will yield a box of maximum volume? What is the maximum volume? Round to the nearest tenth, if necessary.

6) \_\_\_\_\_

A) 20 in.  $\times$  20 in.  $\times$  10 in.; 4000 in<sup>3</sup>

B) 20 in.  $\times$  20 in.  $\times$  5 in.; 2000 in<sup>3</sup>

C) 15 in.  $\times$  15 in.  $\times$  7.5 in.; 1687.5 in<sup>3</sup>

D) 10 in.  $\times$  10 in.  $\times$  10 in.; 1000 in<sup>3</sup>

- 7) At noon, ship A was 14 nautical miles due north of ship B. Ship A was sailing south at 14 knots (nautical miles per hour; a nautical mile is 2000 yards) and continued to do so all day. Ship B was sailing east at 6 knots and continued to do so all day. The visibility was 5 nautical miles. Did the ships ever sight each other? 7) \_\_\_\_\_
- A) No. The closest they ever got to each other was 6.5 nautical miles.  
 B) Yes. They were within 4 nautical miles of each other.  
 C) No. The closest they ever got to each other was 5.5 nautical miles.  
 D) Yes. They were within 3 nautical miles of each other.

**Use l'Hopital's Rule to evaluate the limit.**

8)  $\lim_{x \rightarrow 0} \frac{\sin 7x}{\tan 3x}$  8) \_\_\_\_\_

- A)  $\frac{7}{3}$                       B) 0                      C)  $\frac{3}{7}$                       D)  $-\frac{7}{3}$

9)  $\lim_{x \rightarrow \infty} x \sin \frac{5}{x}$  9) \_\_\_\_\_

- A) 5                      B) 1                      C)  $\frac{1}{5}$                       D) 0

10)  $\lim_{x \rightarrow \infty} \frac{9x^2 - 5x + 1}{4x^2 + 3x - 8}$  10) \_\_\_\_\_

- A)  $\frac{9}{4}$                       B)  $\infty$                       C) 1                      D) 9

**Find the limit.**

11)  $\lim_{x \rightarrow 0^+} x^{-5/\ln x}$  11) \_\_\_\_\_

- A) -5                      B)  $\frac{1}{e}$                       C)  $\frac{1}{e^5}$                       D)  $e^5$