Class prep quiz on section 4.7, Stewart's Calculus (8th ed.)

1. When you try to solve an optimization problem (min/max word problem), among the steps you might try are:

   (I) Solve the one-variable min/max problem using calculus.

   (II) Use constraints to reduce the problem to a one-variable min/max problem.

   (III) Name variables and translate the facts of the problem into equations.

   (IV) Determine the quantity that needs to be minimized/maximized, and identify any other equations as constraints.

   If you use all of these steps, in what order should you do them?

   (a) IV, III, I, II (b) II, I, III, IV
   (c) III, IV, II, I (d) I, II, III, IV

2. Consider the following optimization problem:

   > Find the radius and height of the cylindrical container whose surface area is 50 square inches that has the largest possible volume.

   Which equation or equations represent a **constraint** in the problem? (I.e., which equations do you use to reduce the quantity being maximized/minimized to a function of one variable?)

   (a) $2\pi r^2 + 2\pi rh = 50$ and $V = \pi r^2 h$ (b) $V = \pi r^2 h$
   (c) $2\pi r^2 + 2\pi rh = 50$ (d) None of the above

3. Consider the following optimization problem:

> Find the length and width of the rectangle of area 24 with the smallest possible perimeter.

Which of the following is a one-variable min/max problem that will produce the answer to the above optimization problem?

(a) Minimize $f(w) = w\left(\dfrac{24-2w}{2}\right)$ as a function of w.

(b) Minimize $f(w) = 2w + 2\left(\dfrac{24}{w}\right)$ as a function of w.

(c) Minimize $f(w) = w(24-w)$ as a function of w.

(d) None of the above.

4. What is the point on the line $y = 5x + 7$ closest to the origin?

(a) $\left(\dfrac{35}{26}, \dfrac{357}{26}\right)$ (b) $(-1, 2)$ (c) $\left(-\dfrac{35}{26}, \dfrac{7}{26}\right)$ (d) $(0, 7)$