MT 1800 Calculus I

Reading Activity 1

Name: _____

Purpose: To provide an opportunity to work on your ability to independently read mathematics.

Procedure: Work on the following questions outside of class. Work on all these questions individually first. You may then consult with one or two other students. Each student should hand in their own copy of this reading activity.

1. **Proportionality relationship:** The body contains two main types of blood vessels – resistance vessels and compliance vessels. In resistance vessels, blood flow, Q, is proportional to the difference between the pressure at the entrance of the blood vessel, P_1, and the pressure at the exit of the blood vessel, P_2. Choose a mathematical statement from the following that correctly describes this relationship.
   a. $Q = .02P_1 - .45P_2$
   b. $Q = .02(P_1 - P_2)^2$
   c. $Q = .02(P_1 - P_2)$
   d. $Q = .02(P_1 - P_2) + 3$

2. A landscape architect plans to enclose a rectangular botanical garden with shrubs costing \$25 per foot along three sides and fencing costing \$10 per foot along the fourth side. Write a mathematical expression for the cost of the fencing as a function of the length and width of the botanical garden. (Sketching a picture of the scenario may help you here.)

3. Consider a cylindrical aluminum can (closed at both ends) of radius, r, and height, h, that holds $40\ in^3$ of juice. Choose a mathematical expression from the following that represents the surface area, S, of this can as a function of its radius. (Note that the volume of a cylinder is $Vol = \pi(radius)^2(height)$.)
   a. $S = \pi r^2 \left(\frac{40}{\pi r^2}\right)$
   b. $S = 2\pi r^2 + 2\pi r \left(\frac{40}{\pi r^2}\right)$
   c. $S = 2\pi r^2 + 2\pi r$
   d. $S = (2\pi r^2) \cdot \left(2\pi r \left(\frac{40}{\pi r^2}\right)\right)$
   e. $S = \frac{40}{\pi \cdot r} + 2\pi r^2$

4. When birds lay eggs, they do so in clutches of several at a time. When the eggs hatch, each clutch gives rise to a brood of baby birds. If the clutch is small, there are few baby birds in the brood; if the clutch is large there are so many baby birds to feed that most die of starvation. A clutch size of 10 results in the maximum number of birds surviving to adulthood per brood. There are no clutch sizes larger than 17 for this particular type of bird.

   Circle the graph below that could represent the number of birds surviving to adulthood per brood as a function of the clutch size.