Math 111   Exam 2 Part II, Winter 2013   **Name:** _____
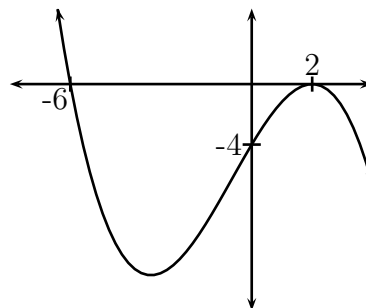
Do **EXACTLY FIVE** of the first six exercises. Cross out the one you don't want me to grade. Each numbered exercise is worth six points.

1. Give the **equation** of a polynomial function (in factored form) that would have a graph like the one shown below and to the right.
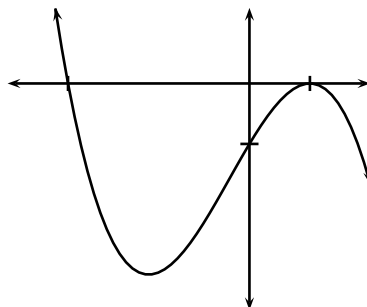
2. Fill in the blanks to describe the behaviors of all the tails for the function whose graph is shown below and to the right.

As $x \to$ _____ , $y \to$ _____

As $x \to$ _____ , $y \to$ _____

As $x \to$ _____ , $y \to$ _____

As $x \to$ _____ , $y \to$ _____

3. Solve the inequality $3x^2 + 5 \geq 16x$, **showing work indicating how you do it. Give your answer using interval notation.**

4. Find the equation of the line through $(2, -3)$ and perpendicular to the line with equation $4x + 5y = 15$.

5. Put $f(x) = -2x^2 + 6x + 7$ in the form $f(x) = a(x - h)^2 + k$ **by completing the square. Show all steps.**

6. **Use algebra** to find the equation of the parabola with vertex $V(3, -2)$ and passing through $(-1, 10)$. Write your answer in standard form $f(x) = a(x - h)^2 + k$.

Do **EXACTLY THREE** of the remaining exercises. Cross out the two you don't want me to grade. Each numbered exercise is worth six points.

7. The length L (in feet) of young blue whales of age t months is given by the equation $L = 4.6t + 24$.

    (a) Give the slope of the line, **with units**:

   (b) Give the y-intercept, with units, and tell what it represents.

8. The height h (in feet) of a projectile t seconds into its flight is given by $h = -16t^2 + 76.3t + 7.9$. Find the maximum height of the projectile and the time when it occurs, both rounded to the tenth's place and with units. **Show in the space below how to obtain your answers ALGEBRAICALLY.**

    Maximum height is _____ at _____ .

9. A farmer is going to create a rectangular field with two "compartments", as shown to the right. He has 2400 feet of fence with which to do this. Give an equation for the area A as a function of x.
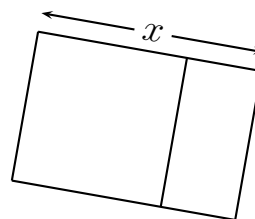
10. The pictures below show how we can start with a rectangular piece of cardboard that is 10 inches by 14 inches and make an open top box out of it. We first cut a square of side length x out of each corner, as shown in the second picture below. We then fold along the dotted lines to form a box, as shown in the last picture. Give an equation for the volume of the box as a function of x.
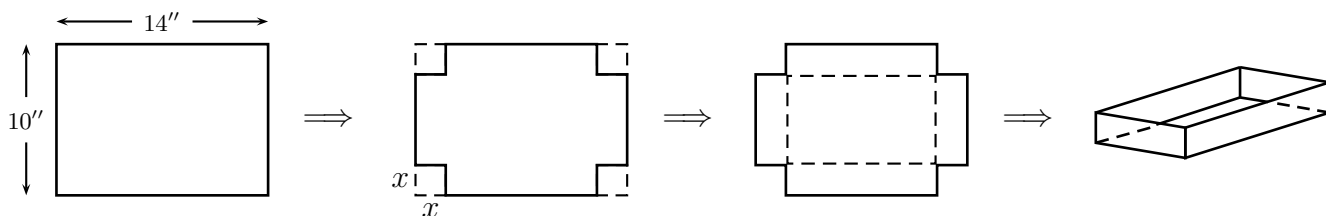
11. At time zero two people are walking along perpendicular roads toward an intersection, where they intend to meet up. At time zero Person A is 200 feet from the intersection and Person B is 300 feet from the intersection. Person A is walking toward the intersection at a rate of 2 feet per second and Person B is walking toward the intersection at 3 feet per second. This is shown below and to the right. Find an equation for the straight line distance d between the two people as a function of time t.