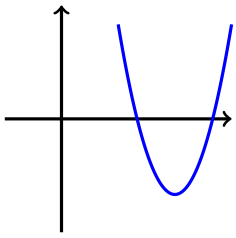
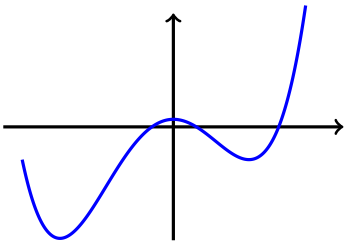
Homework 10 - Math 140 **Name:** _____

For each of the following functions, find the intervals of increase and decrease. Use the graphs to check your answers.

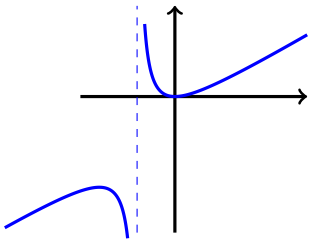
1. $y = x^2 - 6x + 8$



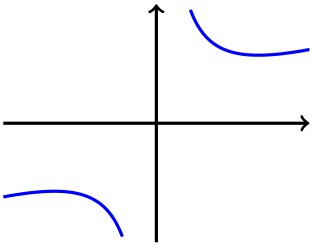
2. $f(x) = \frac{1}{4}x^4 + \frac{1}{3}x^3 - 3x^2 + 1$



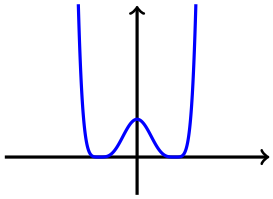
3. $g(x) = \dfrac{x^2}{x+1}$



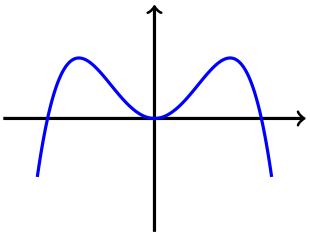
4. $h(x) = \dfrac{x}{3} + \dfrac{3}{x}$



5. $y = (x^2 - 1)^4$



6. $F(x) = x^2(8 - x^2)$



7. A ball thrown in the air has a height of $h(t) = 6 + 32t - 16t^2$ feet, where t is time in seconds. How high is the ball at the highest point in its trajectory?

Make a table of x and y values at the critical points and endpoints for each of the following functions. Indicate which points are the absolute max & min of each function.

8. $y = \frac{1}{3}x^3 - 9x + 2$ on $[0, 4]$.

9. $y = x + \frac{9}{x}$ on $[1, 10]$.

10. $f(x) = x^2(3 - x)$ on $[0, 4]$.

11. A potato farmer estimates that they can get \$8 per bushel for their potatoes on July 1st. On July 1st, the farmer has 60 bushels of potatoes in the field. For each day the farmer waits to harvest, the price of potatoes will fall by 10 cents per bushel. But if the farmer waits, they can increase their harvest by 1 bushel of potatoes per day. Find a formula for the farmer's revenue as a function of the number of days x they wait to harvest. Hint: *both price and quantity are linear functions of x.*

12. Continuing the last problem, how many days should the farmer wait to harvest their potatoes if they want to maximize revenue? Be sure to justify your answer using either the first or second derivative test.