Math 131 - March 9, 2016

Warm-up Problems

1. **(Fun!)** Ten prisonners stand in a line, each wearing either a red or blue hat. Each prisonner can not see his/her own hat. Starting at the back of the line with the prisonner who can see nine hats, each prisonner makes a guess as to the color of his/her own hat. Prisonners who guess correctly will be freed. Those that guess incorrectly will be immediately jailed. Prisonners will hear the guesses made behind them and the consequent sighs of relief or screams.

   Knowing that they are about to play this game, what strategy could the prisonners agree upon to ensure the freedom of a maximal number of prisonners? How many can be freed?

Lecture Problems

2. Describe the following velocity/acceleration situations. Specifically, determine which cases the object is speeding up and which the object is slowing down.

$v > 0$	$v > 0$	$v < 0$	$v < 0$
$a > 0$	$a < 0$	$a > 0$	$a < 0$

3. Drawing Problems

   (a) Draw an example of a function that has domain $[1, 4]$, absolute maximum of 5 at $x = 2$ and an absolute minimum of -1 at $x = 3$.

   (b) Draw an example of a function that has domain $[1, 4]$, absolute maximum of 5 at $x = 2$ and an absolute minimum of 6 at $x = 3$.

   (c) Draw an example of a function that has domain $[1, 4]$, local maximum of 5 at $x = 2$ and an local minimum of 6 at $x = 3$.

   (d) Draw an example of a function that has domain $[1, 4]$ with no absolute maximum and no absolute minimum.

   (e) Draw an example of a continuous function that has domain $[1, 4]$ with no absolute maximum and no absolute minimum.

   (f) Draw an example of a continuous function that has domain $(1, 4)$ with no absolute maximum and no absolute minimum.

4. Working out problems. Find the absolute max and min on the interval.

   (a) $f(x) = 2x^3 + 3x^2 - 12x + 4$ on $[-4, 2]$

   (b) $f(x) = 2x^3 + 3x^2 - 12x + 4$ on $[0, 2]$