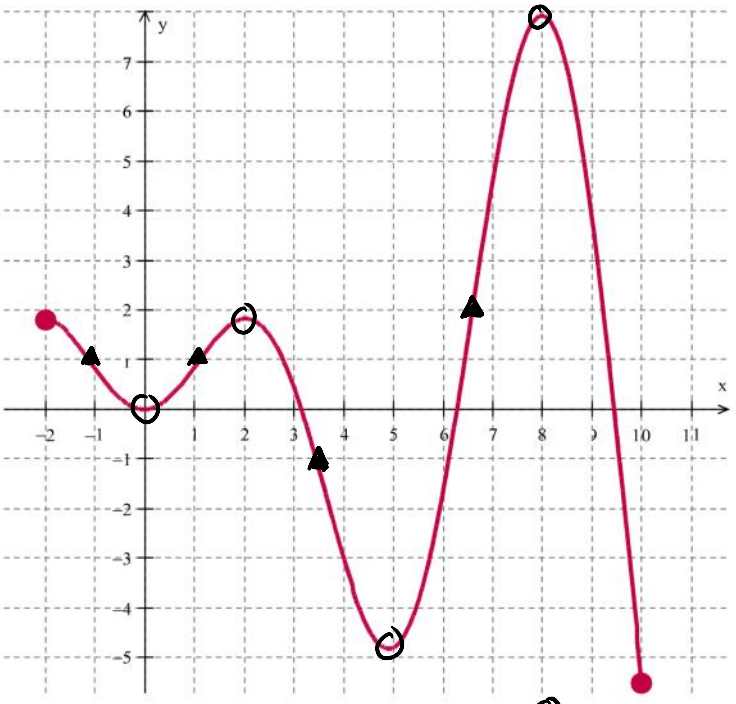
Wednesday, November 04, 2015
3:33 PM

Group Discovery ...

Inserted from: <file://C:\Users\jorr\Desktop\Calculus\Unit 4 Derivative Graph App\Group Discovery Unit 4 Day 1.docx>

Look at the curves on that one!: An introduction to the shape of a graph

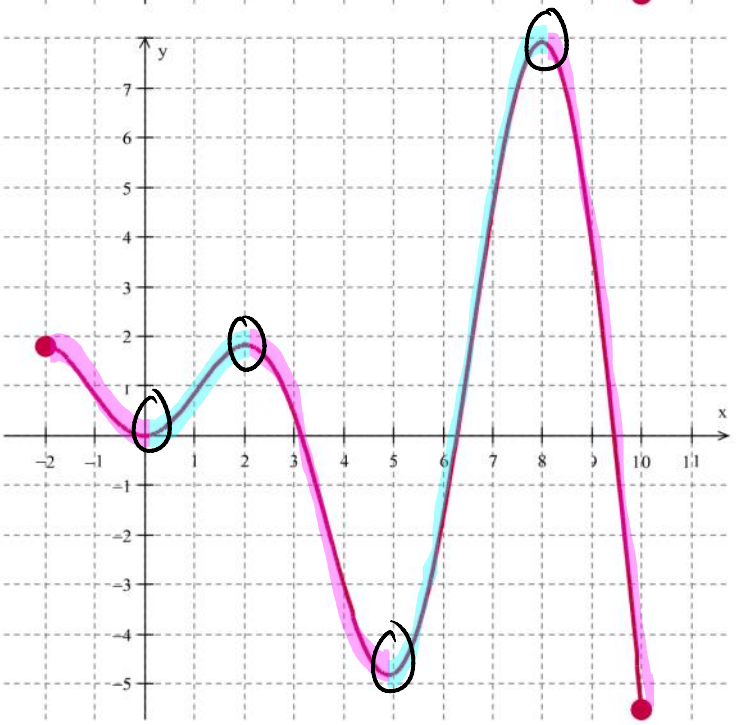


The endpoints of the graph are (-2, 1.8) and (10, -5.5). Label them.

(a) Draw a small triangle on all inflection points. Find the approximate coordinates of these points.

(b) Draw a small circle at the top and bottoms of all humps/troughs. Find the approximate coordinates of these points.

NOW GRAB **FOUR DIFFERENT COLORED MARKERS**



(1) Fill in this box with one of your markers:

= increasing

(2) Fill in this box with another marker:

= decreasing

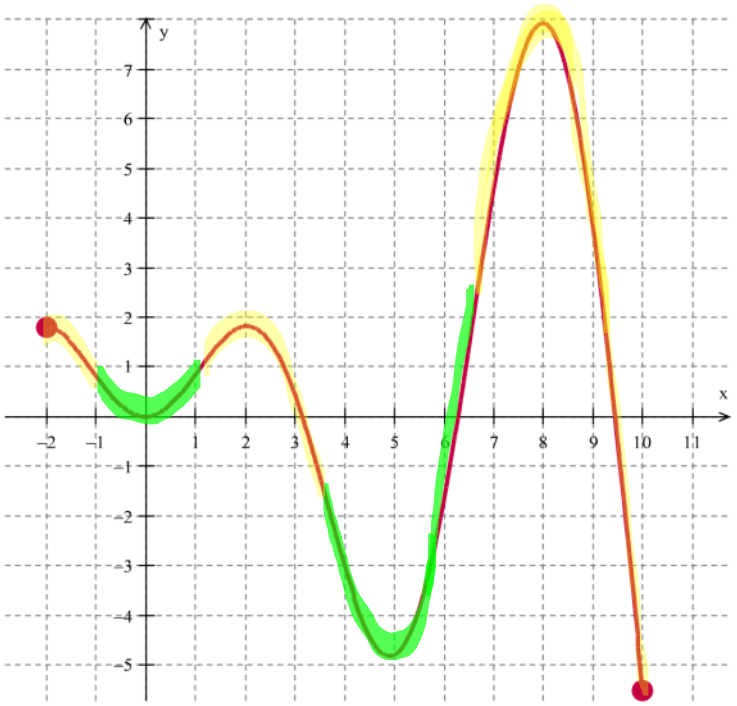
(3) Trace over the part of the function which is *increasing* (obviously using the appropriate color). Do the same where the graph is *decreasing*.

(4) Write in *interval notation* the x-values for which the function is increasing.

$(0,2)$ $(5,8)$

(5) Write in *interval notation* the x-values for which the function is decreasing.

$[-2,0)$ $(2,5)$ $(8,10]$



(1) Fill in this box with one of your markers:

= concave up

(2) Fill in this box with another marker:

= concave down

(3) Trace over the part of the function which is *concave up* (obviously using the appropriate color). Do the same where the graph is *concave down*.

(4) Write in *interval notation* the x-values for which the function is concave up.

$(-1, 1)$ $(3.5, 6.5)$

(5) Write in *interval notation* the x-values for which the function is concave down.

$[-2, -1)$ $(1, 3.5)$ $(6.5, 10]$

Making Observations about Increasing / Decreasing

(c) Make an observation about what you can say about the points on the graph where the function *switches* from *increasing* to *decreasing*, or from *decreasing* to *increasing*.

slope = 0 max/min

(d) Make an observation about what you can say about the *derivative* (the first derivative, to be specific) about a function when it is *increasing*.

$f' +$

(e) Make an observation about what you can say about the *derivative* (the first derivative, to be specific) about a function when it is *decreasing*.

$f' -$

(f) Make an observation about what you can say about the *derivative* (the first derivative, to be specific) about a function when is switching from *increasing* to *decreasing*, or from *decreasing* to *increasing*.

$f' = 0$

Use your markers to trace over the ORIGINAL FUNCTION ONLY in the same way as on the front. Also, use triangles to mark inflection points and small circles to mark humps/troughs. Then, answer the following for the graphs on the right.

(h) Find the x-values where the **first derivative** is zero. Now look at those x-values on the **original function**. What do you notice?

max/mins

(i) Find the x-values where the **second derivative** is zero. Now look at those x-values on the **original function**. Do you notice anything about those points?

inflection pts

(j) Look at all x-values where the **first derivative** is positive. Now look at those x-values on the **original function**. What do you notice?

increasing

(k) Look at all the x-values where the **first derivative** is negative. Now look at those x-values on the **original function**. What do you notice? (And is that true for all four functions?)

decreasing

(l) Look at all x-values where the **second derivative** is positive. Now look at those x-values on the **original function**. What do you notice?

concave up

(m) Look at all x-values where the **second derivative** is negative. Now look at those x-values on the **original function**. What do you notice?

concave down

Graph A: $y = \cos(x)$