Calc AB

AP Packet Day

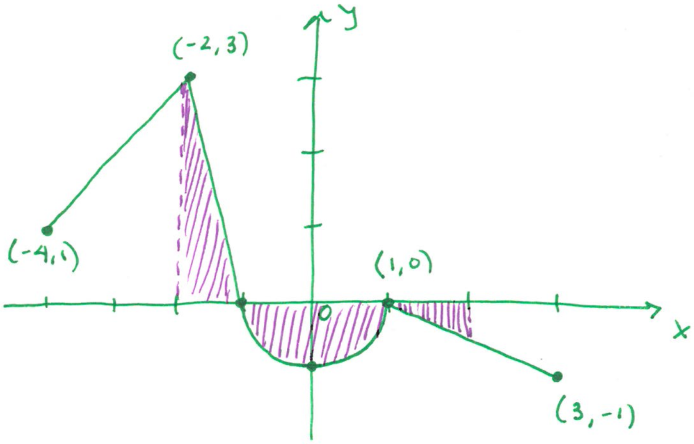
11/19/15

Agenda: 11/19/15

★ Hand out AP Packets

AP Problems - Jagged Line Problems

- Let f be the continuous function defined on [-4, 3] whose graph, consisting of 3 line segments and a semi circle centered at the origin, is given to the right. Let g be the function given by $g(x) = \int_1^x f(t)\,dt$



(a) Find g(2) and g(-2)

$g(2) = \int_1^2 f(t)\,dt = -\frac{1}{2}(1)(\frac{1}{2}) = \boxed{-\frac{1}{4}\text{ units}^2}$

$g(-2) = \int_1^{-2} f(t)\,dt = -\int_{-2}^{1} f(t)\,dt = -\left[\frac{1}{2}(1)(3) - \frac{1}{2}\pi(1)^2\right] = -\frac{3}{2} + \frac{\pi}{2} = \boxed{\frac{\pi - 3}{2}\text{ units}^2}$

(b) For each of g'(-3) and g''(-3), find the value or state that it does not exist.

$g'(x) = \frac{d}{dx}\int_1^x f(t)\,dt = f(x)$ so $g'(-3) = f(-3) = \boxed{2}$

$g''(-3) = f'(-3) = \boxed{1}$ Slope of the tangent line to f(x) at x = -3

(c) Find the x-coordinate of each point at which the graph of g has a horizontal tangent line. For each of these points determine whether g has a relative minimum, relative maximum, or neither. Justify your answers.

g has a horizontal tangent line when $g'(x) = f(x) = 0$ so at $\boxed{x = -1, \text{ and } x = 1}$

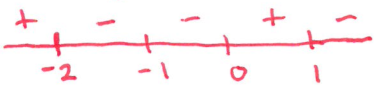
Sign of f

So $\boxed{g \text{ has a local max at } x = -1}$

Because f going from postive to negative at x = +1 means g goes from increasing to decreasing at x = -1.

At x = 1 it is neither a max nor a min as f does not change sign (stays negative) meaning g is decreasing before and after at x = 1.

(d) For -4 < x < 3, find all values of c for which the graph of g has a point of inflection. Explain your reasoning. When f'(x) = 0 or undefined



Inflection points at x = -2, 0 and 1 because this is where f(x) goes from increasing/decreasing meaning g(x) is changing concavity at these points.