Name: _____

1. Class notes for this week: This week we have covered Sections 2.3, 2.4, and part of 2.5. Next week we will cover more of Section 2.5, and also Sections 2.7 and 2.6 (in that order).
2. Do not forget to do your Prior to Drop Date Assessment on WebWork and pay your WebWork fees.
3. (a) (2 points) Find the derivative of the function $h(x) = \frac{\cot x - 1}{\csc x}$. (Hint: There is more than one way to do this problem.)

   (b) (1 point) For what values of x in the interval $[0, 2\pi]$ is the tangent line to $h(x)$ horizontal?

(a) Note $h(x) = \dfrac{\cot x - 1}{\csc x} = \dfrac{\frac{\cos x}{\sin x} - 1}{\frac{1}{\sin x}} = \cos x - \sin x$

$h'(x) = -\sin x - \cos x$

(b) Horizontal Tangent Line $\rightsquigarrow h'(x) = 0$

$0 = -\sin x - \cos x$

$\cos x = -\sin x$

$x = \frac{3\pi}{4}, \frac{7\pi}{4}$

Question 4 is on the back

4. (a) (1 point) Find the tangent line to the curve $f(x) = \frac{1}{(1+x^2)}$ at the point $(-1, \frac{1}{2})$.
   (b) (1 point) Sketch a graph of the curve and tangent line from part (a).
   (This curve is called the **Witch of Agnesi**. You may wish to look up why on Wikipedia.)

(a) Chain Rule $f'(x) = \dfrac{-1}{(1+x^2)^2} \cdot 2x = \dfrac{-2x}{(1+x^2)^2}$

$f'(-1) = \dfrac{2}{2^2} = \dfrac{2}{4} = \dfrac{1}{2}$

Tangent Line $y - \frac{1}{2} = \frac{1}{2}(x+1)$

$y = \frac{1}{2}x + \frac{3}{2}$

(b)