TMATH 125 Quiz 2

Key

Show *all* your work (numerically, algebraically, or geometrically) for each and simplify. No credit is given without supporting work.

1. Given that we know $f'(t) = \dfrac{2}{1+t^2}$, (notice the *derivative*!!!) answer the following:

   (a) [2] (§5.4 #16) Find $\int f'(t)\,dt$

find $\int \frac{2}{1+t^2}\,dt = 2\int \frac{1}{1+t^2}\,dt$ (+.5)

$= 2\arctan(t) + C$ (+.5) (+.5) (+.5)

Recall $\frac{d}{dt}(\arctan t) = \frac{1}{1+t^2}$

CK: $\frac{d}{dt}[2\arctan(t)+C]$

$2\frac{1}{1+t^2} + 0$ ✓

BAD STUFF?

   (b) [2] (WebHW4 #2) If $f'(1) = 0$, find $f(t)$.

Since $f(1)=0$

we know $2\cdot\arctan(1) + C = 0$ (+1)

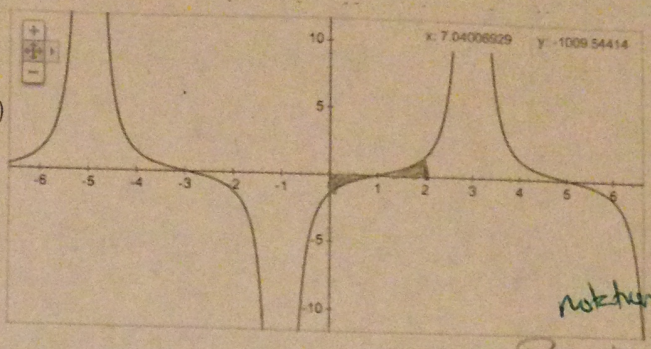
$\Rightarrow 2\cdot\frac{\pi}{4} + C = 0$

$\Rightarrow \frac{\pi}{2} + C = 0$

$\Rightarrow C = -\frac{\pi}{2}$ (+1 dg)

So $f(t) = 2\arctan(t) - \frac{\pi}{2}$

2. Let $v(x) = \sec(\frac{\pi}{4}x - \frac{\pi}{4})\tan(\frac{\pi}{4}x - \frac{\pi}{4})$ whose graph is shown to the right.



(a) [3] (§5.5 #15) Find $\int v(x)\,dx$

$\int \sec(\frac{\pi}{4}x-\frac{\pi}{4})\tan(\frac{\pi}{4}x-\frac{\pi}{4})\,dx$ notation +.5

let $u = \frac{\pi}{4}x - \frac{\pi}{4}$ ↪ $\int \sec(u)\tan(u)\frac{4}{\pi}\,du$ +.5

$du = \frac{\pi}{4}dx$ +.5 +.5

$\Rightarrow \frac{4}{\pi}du = dx$

$= \sec(u)\cdot\frac{4}{\pi} + C$

$= \frac{4}{\pi}\sec(\frac{\pi}{4}x - \frac{\pi}{4}) + C$ +.5

Recall $\frac{d}{dy}(\sec y) = \sec y \tan y$

CK: $\frac{d}{dx}[\frac{4}{\pi}\sec(\frac{\pi}{4}x-\frac{\pi}{4})+C]$

did correctly sub -.5

(b) [1] (Indef Int Wks #3) If v was a velocity function set up the integrals necessary to find the *net* distance traveled from $t = -0$ to $t = 2$. You do *not* need to compute the number!!! Just set up the definite integral(s) that need to be solved.

$\int_{-0}^{2} \sec(\frac{\pi}{4}x-\frac{\pi}{4})\tan(\frac{\pi}{4}x-\frac{\pi}{4})\,dx$

-0 +.5 +.5

(c) [2] (Indef Int Wks #3) If v was a velocity function set up the integrals necessary to find the *total* distance traveled from $t = 0$ to $t = 2$. You do *not* need to compute the number!!! Just set up the definite integral(s) that need to be solved.

$\int_0^1 |\sec(\frac{\pi}{4}x-\frac{\pi}{4})\tan(\frac{\pi}{4}x-\frac{\pi}{4})|\,dx + \int_1^2 |\sec(\frac{\pi}{4}x-\frac{\pi}{4})\tan(\frac{\pi}{4}x-\frac{\pi}{4})|\,dx$

+.5 broke into pieces

+.5 notation

+.5 broke in correct spot

+.5 both made both positive