Quiz 2
Math 252

Name: Key

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

1. [2] Given the graph of f passes through the point $(1, 6)$ and that the slope of its tangent line at $(x, f(x))$ is $2x + 1$, find $f(2)$.

the graph of f passed thru (1,6) $\Rightarrow$ $f(1)=6$

the slope of its tangent line @ $(x,f(x))$ is $2x+1$ $\Rightarrow$ $f'(x)=2x+1$

find $f(2)$

since $f'(x)=2x+1$

(+1/2) $f(x)=x^2+x+C$ for some C

$\frac{d}{dx}(x^2+x+C)=2x+1$ ✓

since $f(1)=6=1^2+1+C$ $\Rightarrow$ $6=2+C$

$\Rightarrow$ $C=4$ (+1/2)

So $f(x)=x^2+x+4$

$\Rightarrow f(2)=2^2+2+4=4+2+4=10$ (+1/2) (+1/2)

2. [2] Find $\frac{d}{dx}\int_1^{x^4} \sec t\, dt$.

FTC Part 1 & chain rule Let $u=x^4$ (+1/2)

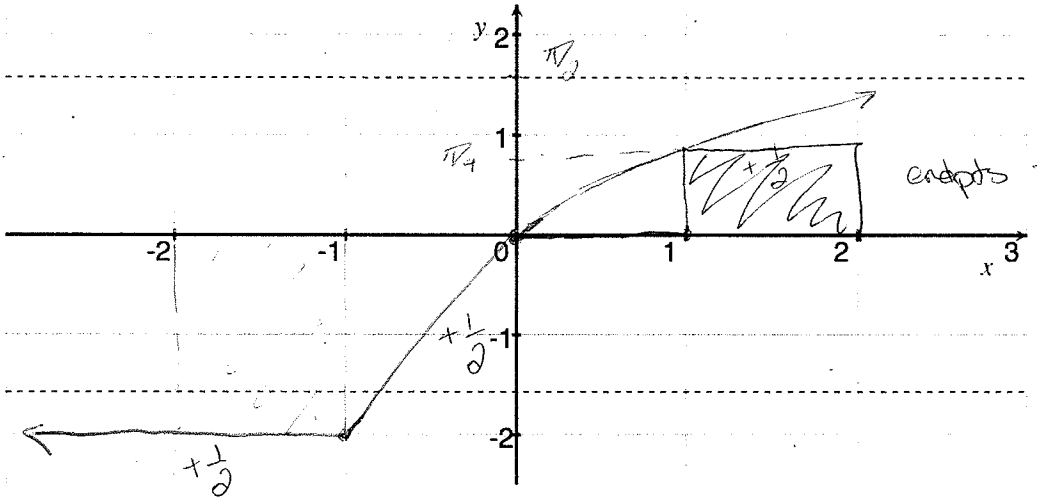
$\frac{d}{du}\left[\int_1^u \sec t\, dt\right]\cdot\frac{du}{dx}=\sec u\cdot\frac{du}{dx}$ (+1/2)

$=(\sec x^4)\cdot 4x^3$ (chain +1/2)

$=4x^3\cdot\sec x^4$ (+1/2)

3. [2] Let $f(x) = \begin{cases} -2 & \text{if } x \leq -1 \\ 2x & \text{if } -1 < x \leq 0 \\ \arctan x & 0 < x \end{cases}$

Carefully draw the graph of f on the graph provided below and use this graph to answer the following questions.



$\frac{3.14}{2} \approx 1.5$

$\pi/4$

(a) [2] Approximate $\int_0^2 f(t)\,dt$, using two approximating rectangles and left endpoints. (Note: you can write this approximate exactly by using the definition of f)

+1 if see boxes $1 \cdot f(0) + 1 \cdot f(1)$

$1 \cdot 0 + 1 \cdot \pi/4$ $\pi/4$

+1/2 +1/2

$\tan^{-1} 0 = 0$

$\tan^{-1} 1 = \pi/4$

(b) [2] Evaluate $\int_{-2}^0 f(t)\,dt$ exactly.

$-1 \cdot 2 + -\frac{1}{2}(1)(2) = -2 + 1 = -3$

+1/2 if see shaded

+1/2 if sign

+1 if 3