# TMATH 125 Quiz 1

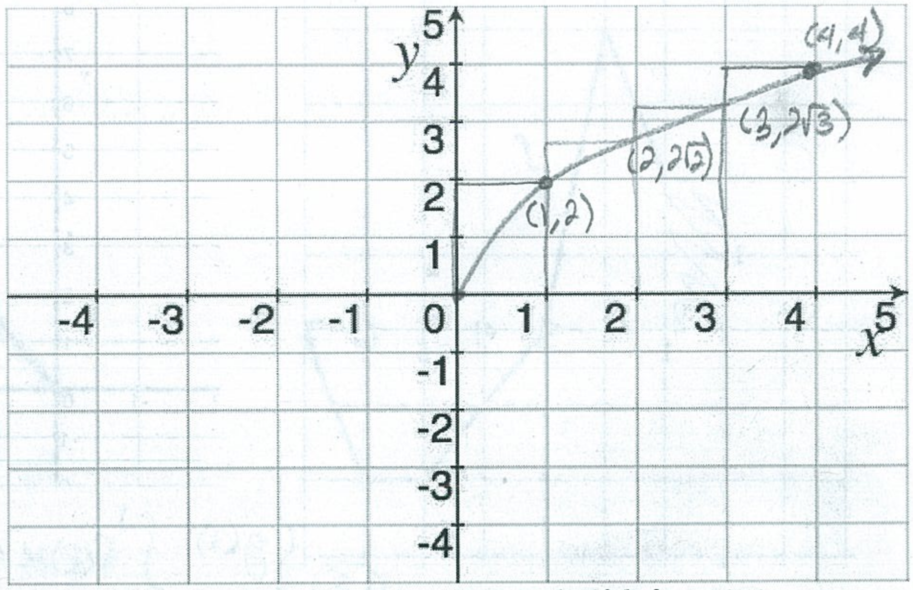
Key

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

1. Let $h(x) = 2\sqrt{x}$.

   (a) [1] (WebHW2 #6)
   Draw the graph of $h$.

   $2\sqrt{x}$ is the graph of $\sqrt{x} = y$ vertically stretched by a factor of 2




   (b) [2] (§5.1#2) Use your graph to estimate the area under the graph of $h$ from 0 to 4 using four rectangles. Indicate if you are using right endpoints, left endpoints, or midpoints in your estimation.

using Right endpts
Adding up the area of 4 rectangles } +.5

$Area_1 + Area_2 + Area_3 + Area_4$

$(1)(2) + (1)(2\sqrt{2}) + (1)\cdot(2\sqrt{3}) + (1)(4)$ or $(1)(2) + (1)(2.6) + (1)(3.2) + (1)(4)$

$2 + 2\sqrt{2} + 2\sqrt{3} + 4$

$6 + 2(\sqrt{2} + \sqrt{3})$

heights +.5
base +.5

   (c) [2] (FTC Wks) Find $\dfrac{d}{dt}\left(\displaystyle\int_t^3 h(x)\,dx\right)$.

integral prop +.5

$$= \frac{d}{dt}\left(-\int_3^t 2\sqrt{x}\,dx\right) = -\left(\frac{d}{dt}\int_3^t 2\sqrt{x}\,dx\right)$$

$$= -\left(2\sqrt{t}\right)$$

$\underbrace{\text{FTC I}}_{+.5}$

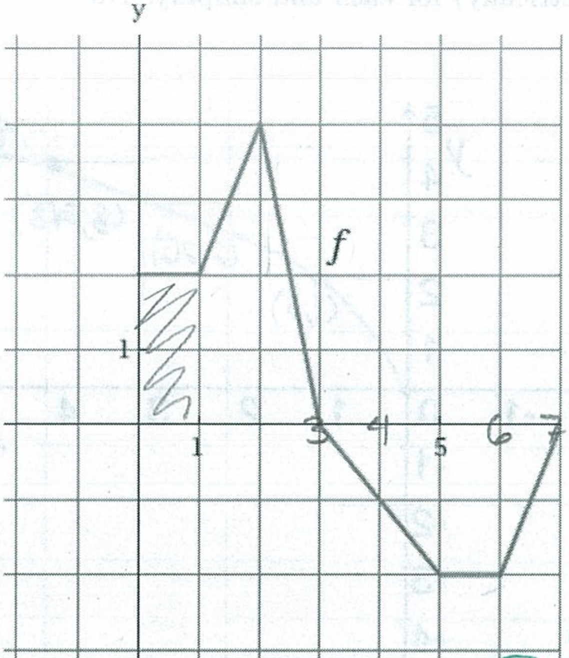
use FTC I correctly $\underbrace{(t\text{ values})}_{+.5}\underbrace{(\text{limits})}_{+.5}$

2. [3] (WebHW3 #7) Let $g(x) = \int_0^x f(t)\,dt$ where $f$ is the function whose graph is shown. Sketch a rough graph of $g$.

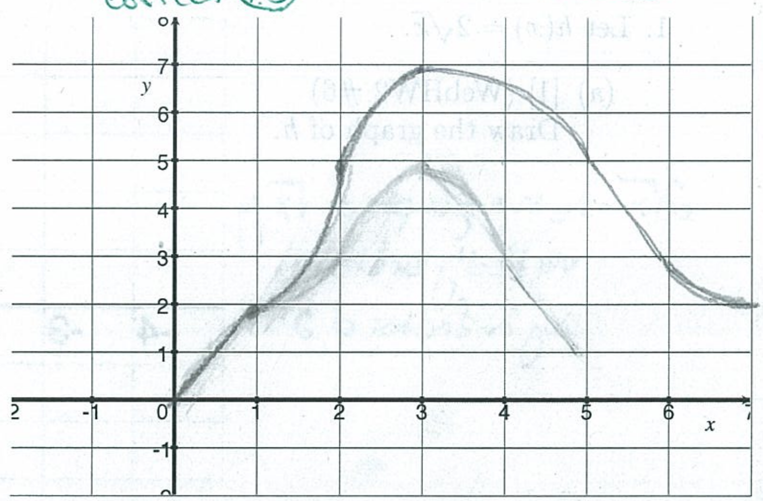
recognize neg area (+.5)

area (+1)

correct (+.5)




cos X (+.5)




(+.5)

$g(1) = \int_0^1 f(t)\,dt = 2$ $\qquad g(3) = \int_0^3 f(t)\,dt = 7$

$g(2) = \int_0^2 f(t)\,dt = 5$ $\qquad g(4) = \int_0^4 f(t)\,dt = 6.5$

$g(5) = \int_0^5 f(t)\,dt = 5$

3. [2] (WebHW3 #14) Evaluate $\int_0^{\frac{\pi}{4}} \sec(\theta)\tan(\theta)d\theta$.

Recall $\frac{d}{d\theta}(\sec\theta) = \frac{d}{d\theta}\left(\frac{1}{\cos\theta}\right) = \frac{d}{d\theta}\left[[\cos\theta]^{-1}\right]$

$= (-1)(\cos\theta)^{-2}\cdot(-\sin\theta) = \frac{\sin\theta}{\cos^2\theta}$ (+.5)

$= \frac{\sin\theta}{\cos\theta}\cdot\frac{1}{\cos\theta} = \tan\theta\cdot\sec\theta$

So By FTC II (+.5)

$\int_0^{\pi/4} \sec(\theta)\tan(\theta)d\theta = \sec\theta\Big]_0^{\pi/4}$ $= \sec\frac{\pi}{4} - \sec 0$ (+.5)

$= \frac{1}{\cos\pi/4} - \frac{1}{\cos 0}$

$= \frac{1}{1/\sqrt{2}} - \frac{1}{1} = \sqrt{2} - 1$

(+.5)