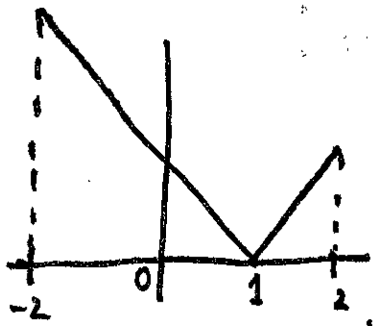
Quiz 1 MAC-2312 Spring 2019 **Name:** Solutions

To receive credit you MUST SHOW ALL YOUR WORK.

1. Evaluate (3 pts each):

(a) $\int_{-2}^{2} |x-1|\, dx = \frac{1}{2}(3)(3) + \frac{1}{2}(1)(1) = \frac{9}{2} + \frac{1}{2} = \frac{10}{2} = \boxed{5}$



using geometry (easiest solution)

Longer solution:

$$\int_{-2}^{2} |x-1|\,dx = \int_{-2}^{1} |x-1|\,dx + \int_{1}^{2} |x-1|\,dx =$$

$$= \int_{-2}^{1} -(x-1)\,dx + \int_{1}^{2} (x-1)\,dx$$

$$= -\left(\frac{x^2}{2} - x\right)\Big|_{x=-2}^{x=1} + \left(\frac{x^2}{2} - x\right)\Big|_{x=1}^{x=2} = \dots = 5$$

(b) $\int_{0}^{\pi/4} \tan x \sec^2 x\, dx$ Let $u = \tan x$
$du = \sec^2 x\, dx$

$$= \int_{u=0}^{u=1} u\,du = \frac{1}{2}u^2\Big|_{u=0}^{u=1} = \frac{1}{2}(1)^2 - \frac{1}{2}(0)^2 = \boxed{\frac{1}{2}}$$

(c) $\int_0^{\sqrt{3}} \frac{x}{\sqrt{1+x^2}}\,dx$ Let $u = 1+x^2$
$\frac{1}{2}du = x\,dx$

$= \frac{1}{2}\int_1^4 \frac{du}{\sqrt{u}} = \frac{1}{2}\cdot 2u^{1/2}\Big|_1^4 = u^{1/2}\Big|_1^4 = 4^{1/2} - 1^{1/2} = \boxed{1}$

(d) Area between $y = \dfrac{1}{3x+1}$ and the x-axis, when $x \in [0,1]$

$A = \int_0^1 \frac{1}{3x+1}$ Let $u = 3x+1$
$\frac{1}{3}du = dx$

$= \frac{1}{3}\int_1^4 \frac{1}{u}\,du = \frac{1}{3}\ln u\Big|_1^4 = \frac{1}{3}\ln 4 - \frac{1}{3}\ln 1$

$\boxed{= \frac{1}{3}\ln 4}$