

1. [12 points] Indicate if each of the following is true or false by circling the correct answer. No justification is required.

- a. [2 points] Let $u(x)$ and $v(x)$ be differentiable functions with $u(0) = u(1) = 0$, then

$$\int_0^1 u(x)v'(x)dx = -\int_0^1 u'(x)v(x)dx.$$

True False

- b. [2 points] The function $f(x) = \int_0^{x^2} e^{t^2} dt$ is decreasing for $x < 0$.

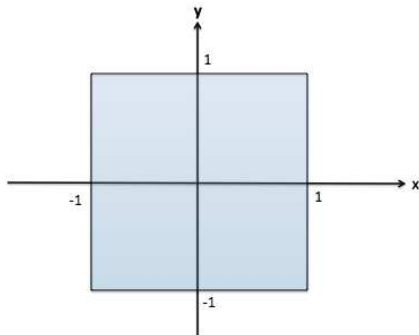
True False

- c. [2 points] For any differentiable function $f(x)$

$$\int_0^x f'(t)dt = \frac{d}{dx} \left(\int_0^x f(t)dt \right).$$

True False

- d. [2 points] If the mass density function of a square plate (shown below) is $\delta(y)$, an even function of y only, then the center of mass of the plate lies on the x -axis.



True False

- e. [2 points] If we use the trapezoidal rule to approximate the integral $I = \int_0^1 (1+2t)dt$ then $\text{Trap}(n)$ is exactly equal to I for every n .

True False

- f. [2 points] If $f(x)$ is concave up, then the average value of $f(x)$ on the interval $[0, 2]$ is larger than $f(1)$.

True False