Math 172 Quiz 1 **Name:** ____________________

Sections: 5.7-6.2

7 September 2018

Point values in $\boxed{\text{boxes}}$.

1. Evaluate.

(a) $\boxed{5}$

$$\int_1^2 \left(1 + \frac{3x^2}{\sqrt{x^3+8}}\right) dx$$

$$= \int_1^2 dx + \int_1^2 \frac{3x^2}{\sqrt{x^3+8}}\,dx = x\Big|_1^2 + \int_9^{16} u^{-1/2}\,du$$

$u = x^3 + 8$

$du = 3x^2\,dx$

$1 \longmapsto 9$

$2 \longmapsto 16$

$$= (2-1) + 2u^{1/2}\Big|_9^{16}$$

$$= 1 + 2(4-3) = 3$$

(b) $\boxed{5}$

$$\int_0^1 \frac{dy}{1+3y^2}$$

$u = \sqrt{3}\,y$ $\quad 0 \longmapsto 0$

$du = \sqrt{3}\,dy$ $\quad 1 \longmapsto \sqrt{3}$

$$= \frac{1}{\sqrt{3}} \int_0^{\sqrt{3}} \frac{du}{1+u^2}$$

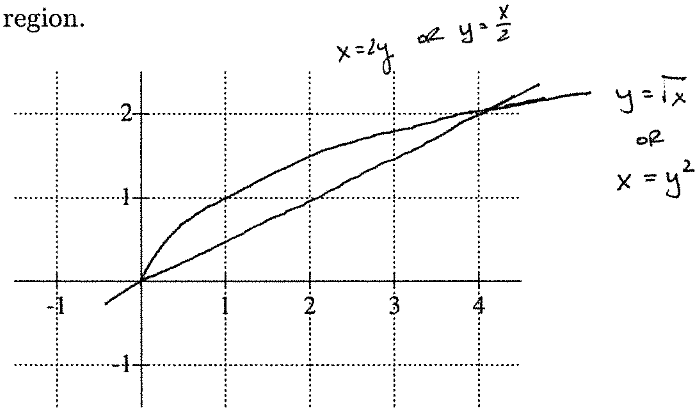
$$= \frac{1}{\sqrt{3}} \arctan u \Big|_0^{\sqrt{3}} = \frac{1}{\sqrt{3}} \left(\arctan\sqrt{3} - \arctan 0\right)$$

$$= \frac{1}{\sqrt{3}} \left(\frac{\pi}{3}\right)$$

Continued on the reverse.

2. Consider the region bounded by the graphs of $y = x/2$ and $y = \sqrt{x}$.

(a) $\boxed{1}$ Carefully sketch the region.



(b) $\boxed{3}$ Express the area of the region as an integral with respect to x, i.e., a dx integral. **Do Not Evaluate.**

$$\int_0^4 \left(\sqrt{x} - \frac{x}{2}\right) dx$$

(c) $\boxed{3}$ Express the area of the region as an integral with respect to y, i.e., a dy integral. **Do Not Evaluate.**

$$\int_0^2 (2y - y^2)\, dy$$

(d) $\boxed{3}$ A solid has base given by the region and cross sections perpendicular to the y-axis are squares. Express the volume of the solid as an integral. **Do Not Evaluate.**

$$\int_0^2 (2y - y^2)^2\, dy$$