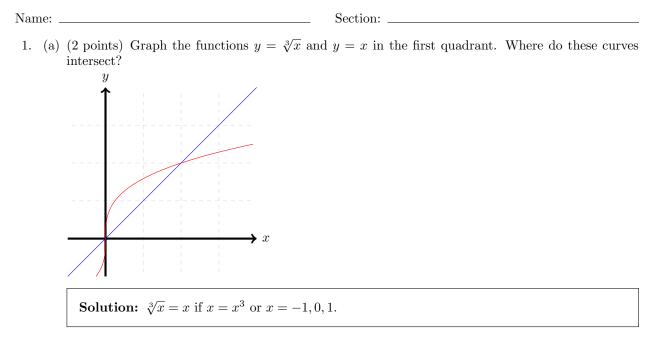Answer all questions and show your work. Unsupported answers may receive *no credit.* You may not use a calculator on this quiz. Allow 15 minutes for the quiz.

Name: ——————————————————   Section: ——————————————————

1. (a) (2 points) Graph the functions $y = \sqrt[3]{x}$ and $y = x$ in the first quadrant. Where do these curves intersect?

Solution: $\sqrt[3]{x} = x$ if $x = x^3$ or $x = -1, 0, 1$.

What integrals calculate the volume of the solid given by rotating the region bounded by these curves around the y-axis? You do not need to integrate!

(b) (3 points) Use the disk/washer method.

Solution: Then $x = y^3$ and $x = y$ so $\displaystyle\int_0^1 \pi(y^2 - (y^3)^2)dy$

(c) (3 points) Use the shell method.

Solution: $\displaystyle\int_0^1 2\pi x(\sqrt[3]{x} - x)dx$

2. (2 points) What integral computes the arc length of the curve

$$y = x^2$$

from $x = 1$ to $x = 4$? You do not need to integrate.

Solution: Since $y' = 2x$ the arc length formula is $\displaystyle\int_1^4 \sqrt{1 + (2x)^2}dx$. This can be integrated using trig substitution.