

## Quiz 1: Math 141 Spring 2008

Print your name and the time of your Lab in the upper right corner. Be sure to follow directions carefully and answer all the questions fully. Explain the steps you took to get the answer.

- (1) Consider a sphere with radius 1 foot. Cut the sphere exactly in half and attach it to cone which is 3 feet tall with an open base. You should be picturing something that looks like an ice cream cone. What is the volume and surface area of this new figure?

*For both calculations, we need to add half a sphere to a cone. For the surface area, we need the distance from the vertex of the cone to the edge of the base. This distance is*

$$\sqrt{1^2 + 3^2} = \sqrt{10}$$

*by the Pythagorean theorem.*

$$\text{Surface Area} = (4\pi(1)^2)/2 + \pi(1)\sqrt{10} = (2 + \sqrt{10})\pi \text{ ft.}^2$$

$$\text{Volume} = (4\pi(1)^3/3)/2 + (\pi(1)^2(3))/3 = 5\pi/3 \text{ ft.}^3$$

- (2) Assume that  $\theta$  is an angle in the first quadrant. If  $\cos \theta = 1/5$ , what is  $\sin \theta$  and  $\tan \theta$ ?

*Since*

$$\sin^2 \theta + (1/5)^2 = 1,$$

*we have*

$$\sin^2 \theta = 24/25.$$

*Since  $\theta$  is in the first quadrant,  $\sin \theta \geq 0$ . Therefore,*

$$\sin \theta = \sqrt{24}/5$$

*and*

$$\tan \theta = \frac{\sqrt{24}/5}{1/5} = \sqrt{24}.$$

- (3) What is the exact value of the tangent of 150 degrees?

*Since 150 degrees is an angle in the second quadrant with reference angle of 30 degrees, we know that*

$$\tan(150^\circ) = \frac{\sin(30^\circ)}{-\cos(30^\circ)} = \frac{1/2}{-\sqrt{3}/2} = -1/\sqrt{3}.$$