81. dV if the radius of a sphere changes from r by dr.

82. dV if a circular cylinder with $r = 2$ changes height from 3 cm to 3.05 cm.

83. dV if a circular cylinder of height 3 changes from $r = 2$ to $r = 1.9$ cm.

For the following exercises, use differentials to estimate the maximum and relative error when computing the surface area or volume.

84. A spherical golf ball is measured to have a radius of 5 mm, with a possible measurement error of 0.1 mm. What is the possible change in volume?

85. A pool has a rectangular base of 10 ft by 20 ft and a depth of 6 ft. What is the change in volume if you only fill it up to 5.5 ft?

86. An ice cream cone has height 4 in. and radius 1 in. If the cone is 0.1 in. thick, what is the difference between the volume of the cone, including the shell, and the volume of the ice cream you can fit inside the shell?

For the following exercises, confirm the approximations by using the linear approximation at $x = 0$.

87. $\sqrt{1 - x} \approx 1 - \frac{1}{2}x$

88. $\frac{1}{\sqrt{1 - x^2}} \approx 1$

89. $\sqrt{c^2 + x^2} \approx c$