84. Suppose a fighter plane fires a missile at 500 mph in the forward direction at a moment when the plane itself is flying at 900 mph. Use Einstein's relativistic formula to find the missile's velocity relative to Earth and compare it with Galileo's prediction of $500 + 900 = 1400$ mph. Approximate the speed of light by 3×10^8 m/s.

85. In this exercise, we are going to up the numbers of Exercise 84 significantly. Suppose a rocket is traveling away from Earth at a speed of $0.7c$ and fires another rocket at $0.5c$. Use Einstein's formula to calculate the velocity of the second rocket relative to Earth.

Concept Check

86–92 Determine whether the given statement is true or false. In case of a false statement, explain or provide a counterexample.

86. The disk method is based on the idea of integrating slices.

87. When both the disk method and the shell method are applied to calculate the volume of a solid of revolution, the variable of integration is always the same.

88. If the area of the region bounded by $y = f(x)$ and $y = g(x)$ is A, then the volume of the solid obtained by revolving the same region about the x-axis is $V = \pi A^2$.

89. If the area of the region bounded by $y = f(x)$ and $y = g(x)$ is A, then the volume of the solid obtained by revolving the same region about the x-axis never equals πA^2.

90. $\lim\limits_{x\to-\infty} \tanh x = -1$

91. $\cosh 2x = 2\sinh^2 x + 1$

92. The work needed to pump fluid out of a tank through an opening on its top equals the total weight of the fluid multiplied by the distance traveled by its center of mass.

Chapter 6
Technology Exercises

93–96 Use a graphing utility to find (or approximate) the volume of the solid generated by rotating the region bounded by the graphs of the given equations about the indicated axis.

93. $y = \sin(x^2),\quad y = 0,\quad x = 0,\quad x = \sqrt{\pi}$; about the x-axis

94. $y = \arccos x,\quad y = 0,\quad x = 0,\quad x = 1$; about the x-axis

95. $y = \sinh^{-1} x,\quad y = 0,\quad x = 4$; about the y-axis

96. $y = x^2\sin^2 x,\quad y = 0,\quad x = 0,\quad x = \pi$; about the y-axis

97–98 Use a graphing utility to find the arc length of the graph of the equation over the given interval.

97. $y = \dfrac{1}{x^2+1};\quad -1 \le x \le 1$

98. $y = \sin x;\quad 0 \le x \le \pi$

99–100 Use a graphing utility to find the surface area of the solid generated by revolving the given curve about the indicated axis.

99. $y = \sin x;\quad 0 \le x \le \pi;$ about the x-axis

100. $y = \sqrt{\ln x};\quad 1 \le x \le e;$ about the y-axis