1. Approximate answers are acceptable for this problem.
   (a) \( f(\text{noon}) = 87^\circ, f(\text{6 p.m.}) = 67^\circ \), range of \( f \) is \([53, 87]\).
   (b) \( f \) is increasing on \((6, 12)\) and \((20, 22)\); \( f \) is decreasing on \((0, 6), (12, 20)\) and \((22, 24)\).
   (c) Possible explanations for the drop in temperature at noon are a sudden thundershower, or an air conditioner being turned on.
   (d) A possible explanation for \( f \) attaining its minimum value at 6 A.M. is that this is just before sunrise.

2. The total volume is the volume of a cylinder of height and radius \( r \) plus the volume of a hemisphere of radius \( r \), that is, \( V = \pi r^2 h + \frac{2}{3} \pi r^3 \).

3. (a) If we buy 8 cards for $2.80, then this costs less than buying 6 individual cards at $0.50 apiece. Hence, 
   \[ C(6) = $2.80. \]

   (b) \[ e \sim 10 \]

   (c) \[ e(x) = \begin{cases} 
   25 + 0.5(x - 80) & \text{if } 80 \leq x \leq 85 \\
   27.8 & \text{if } 86 \leq x \leq 88 \\
   27.8 + 0.5(x - 88) & \text{if } 89 \leq x \leq 90 
   \end{cases} \]

   (d) To buy 1005 cards, the best deal is to buy one carton (800 cards), two boxes (160 cards), five packs (40 cards) and five individual cards. The total cost would be
   \[ 230 + 2(25) + 5(2.80) + 5(0.50) = $296.50 \]

4. (a) [Graph of function with x-axis from -2 to 4 and y-axis from -8 to 8]

   (b) [Graph of function with x-axis from -6 to 0 and y-axis from -4 to 1]
5. (a) \((f \circ g) \, (2) = f \, (0) = 1\)
(b) \((g \circ f) \, (2) = g \, (3) = 1\)
(c) \((f \circ f) \, (2) = f \, (3) = 4\)
(d) \((g \circ g) \, (2) = g \, (0) = 4\)
(e) \((f + g) \, (2) = f \, (2) + g \, (2) = 3 + 0 = 3\)
(f) \(\left( \frac{f}{g} \right) \, (2)\) is undefined because \(g \, (2) = 0\).

6. \(f \, (x) = \begin{cases} 
-x - 1 & \text{if } x < -1 \\
\sqrt{1 - x^2} & \text{if } -1 \leq x \leq 1 \\
-x + 1 & \text{if } x > 1 
\end{cases}\)

7. (a) \(g \, (x) = 3x^2 + 3x\)
(b) \(g \, (4) = 60, f \, (4) = 59.023837\)
(c) The percentage error in using \(g \, (4)\) as an approximation for \(f \, (4)\) is \(100 \left| \frac{f \, (4) - g \, (4)}{g \, (4)} \right| = 1.63\%\).
(d) For larger values of \(x\), \(g \, (x)\) is an overestimate of \(f \, (x)\) because the coefficient of the dominant term \((x^2)\) is larger.

8. (a) \(f \, (50,000) - f \, (49,999)\) represents the cost of producing the 50,000th disc.
(b) The cost per disc is cheapest for \(30,000 < a < 40,000\). This is where the slope of \(f\) is the smallest.
(c) One possible explanation for the sudden increase in the curve’s slope is scarcity of materials.