## 23.3 The Fundamental Theorem of Calculus

1. (a) Increasing on [-4, 0] and [4, 6]. Decreasing on [-6, -4] and [0, 4].
   Concave up on (-6, -2), (1, 2) and (3.5, 6). Concave down on (-2, 1) and (2, 3.5).

   (b) Increasing on [-4, 0] and [4, 6]. Decreasing on [-6, -4] and [0, 4].
   ($G(x)$ is a vertical shift of $F(x)$.)

   (c) Local minimum at $x = -4$ and $x = 4$.

   (d) $G(x)$ is a vertical shift of $F(x)$. The slopes of F and G are the same everywhere.

   (e) $G(x)$ is a vertical shift of $F(x)$. $F(x) = G(x) + \left[\int_{-6}^{1} f(t)dt \right]$.

2. The graph must be increasing over the whole domain.
   It is concave down changing to concave up at the q
   value where the original graph was lowest.
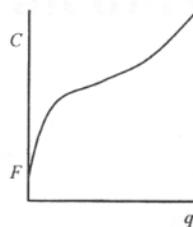
3. (a) $\int_{-2}^{6} r(t)dt = \int_{-2}^{7} r(t)dt - \int_{2}^{7} r(t)dt + \int_{2}^{6} r(t)dt = 4 - 1 + 0 = 3$

   (b) $50 + \int_{2}^{7} r(t)dt = 50 + 1 = 51$ liters.