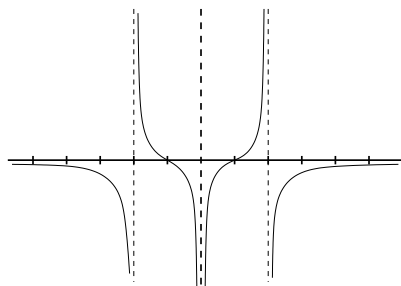**Section 4.1-4.3 Part 1 : Additional Problems Solutions**

1. (a) $(-\infty, a)$, (e, ∞)

   (b) (a, c), (c, e)

   (c) $x = a$ is a local maximum
   $x = e$ is a local minimum
   $x = c$ is a neither
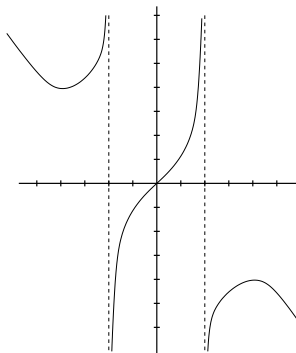
   (d) $f(b)$ is larger

2. (a) (a, d), (e, ∞)

   (b) $(-\infty, a)$, (d, e)

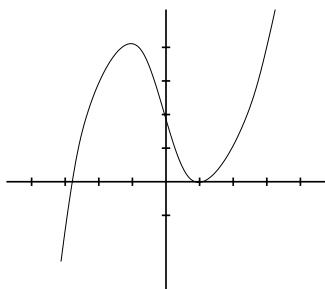   (c) $x = a$ is a local minimum
   $x = d$ is a local maximum

   Note: $x = d$ is a critical value since $f'(d)$ is undefined and $x = d$ is in the domain of $f(x)$. $x = e$ is not in the domain of $f(x)$.

3. (a) (b, c), (d, ∞)

   (b) $(-\infty, b)$, (c, d)
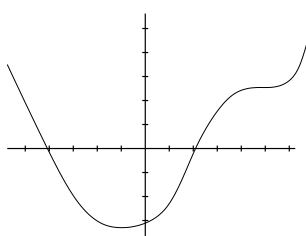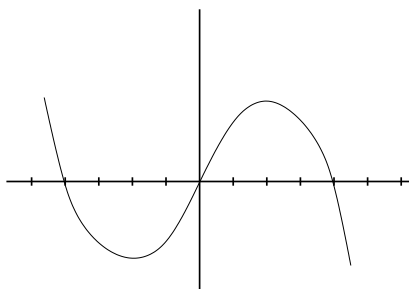
   (c) $x = b$, $x = c$, $x = d$

4. Graph of $f(x)$.
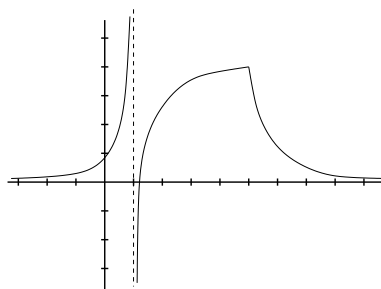
5. Graph of $f(x)$.

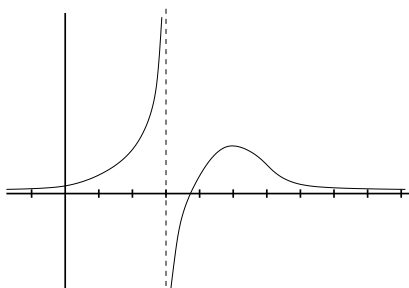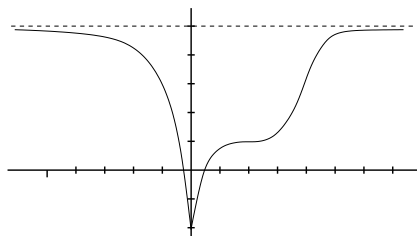6. Graph of $f(x)$.

7. Graph of $f(x)$.

8. Graph of $f(x)$.

9. Graph of $f(x)$.

10. Graph of $f(x)$.

11. Graph of $f(x)$.

12. Graph of $f(x)$.