Section 4.1-4.3 Part 3 : Additional Problems Solutions

1. (a) function is continuous on the interval.
   critical values: $x = 2$ and $x = 6$
   both critical values are in the interval, so evaluate $f(1)$, $f(2)$, $f(6)$, and $f(9)$
   abs max: 66
   abs min: -15

   (b) function is continuous on the interval.
   critical values: $x = 2$ and $x = 6$
   critical value $x = 6$ is not in the interval, so only evaluate $f(1)$, $f(2)$, and $f(4)$
   abs max: 17
   abs min: 1

   (c) function is continuous on the interval.
   critical values: $x = 2$ and $x = 6$
   critical value $x = 2$ is not in the interval and the interval is not closed. evaluate $f(6)$ and look at the shape (increasing/decreasing) of the function on the given interval.
   abs max: none
   abs min: -15

2. (a) function is continuous on the interval.
   critical values: none
   only have to evaluate the ends of the interval: $f(0)$ and $f(2)$
   abs max: 1
   abs min: $\frac{1}{9}$

   (b) vertical asymptote at $x = 3$, so the function is not continuous on the interval.
   critical values: none
   examine the behavior of the function for values close to the vertical asymptote, i.e. $\lim_{x\to 4^-} f(x)$ and $\lim_{x\to 4^+} f(x)$, and the values of the ends of the interval.
   abs max: none
   abs min: $\frac{1}{16}$

   (c) since the interval is all real numbers, look at the intervals where the function is increasing/decreasing as well as any vertical and horizontal asymptotes to draw a rough sketch of the function.
   abs max: none
   abs min: none

3. (a) abs max: 1
   abs min: $\frac{-1}{8}$

   (b) abs max: 3
   abs min: none

   (c) abs max: none
   abs min: $\frac{-1}{8}$

4. (a) abs max: $\frac{1}{16}$
   abs min: none

   (b) abs max: $\frac{1}{12}$
   abs min: none

   (c) abs max: $\frac{1}{12}$
   abs min: none

5. (a) abs max: $\frac{1}{3}$
   abs min: $\frac{1}{4}$

   (b) abs max: none
   abs min: none

6. Look at the graph of $f(x)$ on the given interval.
   abs max: 1
   abs min: 0 since the interval includes the value of $x = \frac{-\pi}{2}$