Question 1 (1 pts)

Fill in the blank:

If the graph of f lies above all of its tangents on an interval I, it is called ______.
If the graph of f lies below all of its tangents on an interval I, it is called ______.

A. An inflection point.
   A non-inflection point.

B. Concave downward.
   Concave upward.

C. Concave upward.
   Concave downward.

D. f' exists.
   f'' exists.

Question 2 (1 pts)

Suppose we have a point P on a curve $f(x)$. If P is an inflection point, what does that mean for f?

A. f'' is continuous.

B. f is continuous at P and the curve changes from concave upward to concave downward (or concave downward to concave upward).

C. f' is continuous.

D. The graph of f is concave upward.

Question 3 (1 pts)

Suppose we have a function f. If the graph of f is concave downward on some interval I, what does that tell us about $f''(x)$?

A. $f''(x) < 0$ for all x in I.

B. $f'(x) > 0$ for all x in I.

C. $f''(x) > 0$ for all x in I.

D. $f'(x) < 0$ for all x in I.

Question 4 (1 pts)

Suppose f'' is continuous near c. Fill in the blank:

If $f'(c) = 0$ and $f''(c) > 0$, then ______. If $f'(c) = 0$ and $f''(c) < 0$, then ______.

A. f has an absolute minimum at c.
   f has an absolute maximum at c.

B. f is concave upward.
   f is concave downward.

C. f has a local maximum at c.
   f has a local minimum at c.

D. f has a local minimum at c.
   f has a local maximum at c.

Question 5 **(1 pts)**

The concavity test only has cases where $f''(c) < 0$ and $f''(c) > 0$ for the graph f. What do you generally expect to happen if $f'(c) = 0$?

A. Concave upward.

B. There is an inflection point.

C. The second derivative does not exist.

D. Concave downward.

Question 6 **(1 pts)**

$\lim_{x\to\infty} \frac{3x^2-2}{x^2+1} = 3$. This means that the line $y = 3$ is a/an ______.

A. Inflection point.

B. Local maximum.

C. Local minimum.

D. Horizontal asymptote.

Question 7 **(1 pts)**

When will the function $f(x) = \frac{x^2-1}{2x-3}$ have a vertical asymptote?

A. at $x = 3/2$

B. at $x = 1$

C. at $x = \infty$

D. There is no vertical asymptote.

Question 8 **(1 pts)**

What do the following statements all have in common?

$\lim_{x\to-\infty} f(x) = \infty$, $\lim_{x\to-\infty} f(x) = -\infty$, $\lim_{x\to\infty} f(x) = -\infty$

A. The limits do not exist.

B. The values of $f(x)$ become arbitrarily large (positive or negative) as we let x become arbitrarily large (positive or negative).

C. The limit is not defined since we will have complex numbers in the answer.

D. There is a horizontal asymptote at $y = 0$.

Question 9 **(1 pts)**

Let $f(x) = \frac{1}{x^r}$. When is $\lim_{x\to\infty} f(x)$ not defined?

A. When $x \leq 0$.

B. When x goes to ∞

C. When x goes to $-\infty$.

D. When $r \leq 0$.

Question 10 **(1 pts)**

Let $f(x) = 1 + \frac{1}{x} + \frac{1}{x^2} - \frac{2}{x^3} + \frac{3}{x^5}$. Evaluate $\lim_{x\to\infty} f(x)$.

A. ∞

B. 8

C. 1

D. $\nexists$