

Name: \_\_\_\_\_

### Calculus Practice Quiz #4

This quiz is to determine if you have mastered the material by attending tutoring sessions and completing your homework. Please write legibly and show as much work as possible for each problem.

1. Find the open intervals where each function is increasing/decreasing and any relative extrema.

a.  $f(x) = 3x^5 + 30x^4 + 80x^3 + 1$

b.  $f(x) = x^2 + 2x \sin x + 2 \cos x, \quad \left(-\frac{\pi}{2}, \frac{3\pi}{2}\right)$

c.  $f(x) = 2x - 6x^{2/3}$

d.  $f(x) = \sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right), \quad \left(-\frac{\pi}{2}, \frac{3\pi}{2}\right)$

2. Find the open intervals where each function is concave up/down and any points of inflection.

a.  $f(x) = x^4 + 8x^3 + 24x^2 + 6x - 32$

b.  $f(x) = \frac{1}{2x} - \frac{1}{3x^2} + \frac{1}{3x^3}$

c.  $f(x) = \cos x - \sqrt{3} \sin x, \quad [0, 2\pi]$

3. Compute each limit.

a.  $\lim_{x \rightarrow \infty} \frac{\sqrt{1+4x^2}}{3x-2}$

b.  $\lim_{x \rightarrow \infty} \frac{3-x}{\sqrt{2x^2+6x+9}}$

c.  $\lim_{x \rightarrow \infty} \left(2x - \sqrt{4x^2+5}\right)$

4. Find the horizontal asymptotes of each function.

a.  $y = \frac{\sqrt{x^2 - 7x + 12}}{2x + 3}$

b.  $y = \frac{6x^2 + 5x + 4}{\sqrt{x^4 + x^2 + 1}}$