

Present neatly on separate paper. Justify for full credit. No Calculators.

Name _____ Score _____ 15 minutes / A x 4

1) Use the sketching guidelines we learned in class to discuss the function: (20 points)

$$y = \frac{1}{x^2} - \frac{1}{(x-2)^2}$$

2) Sketch a function that satisfies all the given conditions: (5 points)

$f(0) = 0$, f is continuous and even,

$f'(x) = 2x$ if $0 < x < 1$, $f'(x) = -1$ if $1 < x < 3$,

$f'(x) = 1$ if $x > 3$

3) Find the limit or explain why it doesn't exist. [5 points]

a)

$$\lim_{x \rightarrow 0} \frac{x3^x}{3^x - 1}$$

b)

$$\lim_{x \rightarrow 0} \frac{\cos mx - \cos nx}{x^2}$$

Present neatly on separate paper. Justify for full credit. No Calculators.

Name _____ Score _____ 15 minutes / F x 4

1) Use the sketching guidelines we learned in class to discuss the function: (20 points)

$$y = x^2/(x + 8)$$

2) Sketch a function that satisfies all the given conditions: (5 points)

$$\begin{aligned}f(0) &= 0, \quad f'(-2) = f'(1) = f'(9) = 0, \\ \lim_{x \rightarrow \infty} f(x) &= 0, \quad \lim_{x \rightarrow 6} f(x) = -\infty, \\ f'(x) &< 0 \text{ on } (-\infty, -2), (1, 6), \text{ and } (9, \infty), \\ f'(x) &> 0 \text{ on } (-2, 1) \text{ and } (6, 9), \\ f''(x) &> 0 \text{ on } (-\infty, 0) \text{ and } (12, \infty), \\ f''(x) &< 0 \text{ on } (0, 6) \text{ and } (6, 12)\end{aligned}$$

3) Find the limit or explain why it doesn't exist. [5 points]

a)

$$\lim_{x \rightarrow 0} \frac{x}{\tan^{-1}(4x)}$$

b)

$$\lim_{x \rightarrow 0} \frac{x + \sin x}{x + \cos x}$$
