

## Calculus AB Unit 3 Review

### 1. Cat #2 Tangent and Normals

$$\text{Let } f(x) = 6x^2 - 13x - 5$$

- A) Find the zeros of the graph of  $f$ .
- B) Find  $f'(x)$
- C) Find the slope of the tangent line at  $x = -2$
- D) Find  $f(-2)$
- E) Write the equation of the tangent line at  $x = -2$   
In Point-Slope Form
- F) At what value of  $x$  is the slope of the tangent line of  $f(x)$  equal to 2?
- G) At what value of  $x$  is the slope of the tangent line of  $f(x)$  horizontal?

### 2. Cat #2 Tangent and Normals

$$\text{Let } f(x) = \frac{3x}{x-5}$$

- A) Find zeros of  $f$ .
- B) Write the equation of the vertical asymptotes of  $f$
- C) Write the equation of the horizontal asymptotes of  $f$
- D) Find  $f'(x)$
- E) Find the slope of each tangent line to  $f$  at  $x = 6$ .
- F) Find  $f(6)$
- G) Find equation of tangent line at  $x = 6$  in point-slope form

### 3. Cat #3 Differentiation

$$\text{Let } f(x) = [\tan(x)]^2$$

- A) Find  $f'(x)$
- B) Find the slope of the tangent line at  $x = \frac{\pi}{4}$
- C) Find the slope of the normal line at  $x = \frac{\pi}{4}$
- D) Write an equation of the tangent line at point  $(\frac{\pi}{4}, f(\frac{\pi}{4}))$   
in point-slope form
- E) Find the derivative of  $y = x \cos(4x)$
- F) Find the 2nd derivative of  $y = 4 \sin(3x)$
- G) Find the derivative of  $y = x^2 \sqrt{1+3x}$

4. Cat #2 Tangent and Normals

Given  $f(x) = \frac{3x - 5}{x^2 - 4}$

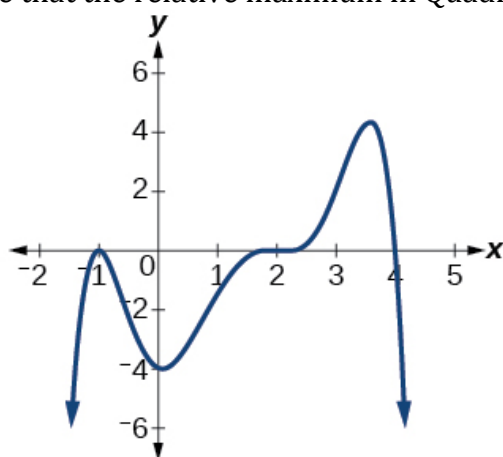
- A) Find the domain of  $f$ . State answer in interval notation.
- B) Find  $f'(x)$ . Simplify answer as needed.
- C) Find  $f(1)$
- D) Find  $f'(1)$
- E) Write an equation for the line tangent at point  $(1, f(1))$

5. Consider the curve:  $3x^2 - 2xy - 5y = 10$

- A) Find  $\frac{dy}{dx}$
- B) If  $x = 1$ , then what is  $y$ ?
- C) Find the slope of the tangent line when  $x = 1$ .
- D) Find the equation of the tangent line when  $x = 1$ .
- E) For the point found in Part B, find the rate of change in the slope at that point.

6. Use the graph to answer the following questions.

Assume that the relative maximum in Quadrant I is  $(3.5, 4)$



- A) Find the average rate of change on the interval  $[0, 4]$ .
- B) For what values of  $x$  is the instantaneous rate of change equal to 0?
- C) On what interval(s) is the instantaneous rate of change positive?
- D) Approximate the instantaneous rate of change when  $x = 3$ .
- E) Is there any point where the instantaneous rate of change is undefined? Explain.
- F) Draw a rough sketch of the derivative function.