

Practice for Math 150 Test 2

1. Find the limits:

a. $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 7x}$

b. $\lim_{x \rightarrow 0} \frac{2x + \sin x}{x}$

c. $\lim_{x \rightarrow 0^+} \sin\left(\frac{1}{x}\right)$

d. $\lim_{t \rightarrow 0} \frac{t}{\cos t}$

2. Find all points of discontinuity: $f(x) = \frac{x+3}{|x^2+3x|}$.

3. Let $f(x) = x^2 - 1$.

a. Find the slope of the secant line between the points on the graph of f for which $x = 1$ and $x = 2$.

b. Use the definition of the derivative to find the slope of the tangent line to the graph of f at the point where $x = 1$.

c. Find an equation of the tangent line to the graph of f at the point where $x = 1$.

4. Use the definition of the derivative to find the derivative of $f(x) = \frac{1}{x+1}$.

5. Find $\frac{dy}{dx}$ (and do not simplify!) if:

a. $y = \frac{5}{x} - \sqrt{2x}$

b. $y = \left(x^4 - \frac{3}{x^2}\right)(x^2 - 2x + 1)$

c. $y = \frac{x^2 - 2x}{4x - 3}$

d. $y = \frac{1-x}{1+\tan x}$

6. Find $f'(x)$ (and do not simplify!) if $f(x) = x^2 \cos x$

7. Find k if the curve $y = x^2 + k$ is tangent to the line $y = 2x$.

