

MCS21 – Calculus
Exam 5 Review Sheet

1. For each of the following, find $f'(x)$.
 - (a) $f(x) = \tan^2 4x$
 - (b) $f(x) = \sqrt{\sin x}$
 - (c) $f(x) = \frac{\sec x}{\tan x}$
 - (d) $f(x) = x^3 \cot x$
 - (e) $f(x) = \tan x - \sec x$
 - (f) $f(x) = \cos^3(2x + 1)$
 - (g) $f(x) = x^2 \cos x$
 - (h) $f(x) = \frac{1}{2 \sin 2x}$
2. If $f(x) = \sin 2x$, find $f''(x)$.
3. If $f(x) = \tan x$, find $f''(x)$.
4. If $f(x) = \sin x + \cos x$, find $f''(x) + f'(x)$.
5. If $f(x) = \cos x \sin 3x$, find $f'\left(\frac{\pi}{6}\right)$.
6. Write the equation of the line normal to the graph of $y = \sqrt[3]{x^2 - 1}$ at the point where $x = 3$.
7. Write the equation of the tangent line to the curve $x^2 + y^2 = 169$ at the point $(5, -12)$.
8. Find the coordinates of all points on the curve $y = 2x^3 - 3x^2 - 12x + 20$ where the tangent line is horizontal.
9. If $x^2y + y^3 = 10$, find $\frac{dy}{dx}$ at the point $(1, 2)$.
10. Write the equation of the tangent line to the graph of $y = 3 \cot^2 x$ at $x = \frac{5\pi}{4}$.
11. Write the equation of the normal line to the graph of $y = 3 \tan(2x)$ at $x = \frac{5\pi}{12}$.
12. Find $\frac{dy}{dx}$ if $-2x^2 + x^3y = 1 + 5y$.
13. Find $\frac{d^2y}{dx^2}$ at the point $(-1, 2)$ in simplest form if $y^2 + 2x^3 = y$.
14. Find $\frac{dy}{dx}$ if $y = 4 \sin^5(\sec(2x^3))$.