

Math 30 – Workshop #10

1. Find the equation of the line that goes through the point $(1, 1)$ and is parallel to the line tangent to the graph of $y = \frac{3}{x} - x^2$ at $x = 2$.
2. For the function $f(x) = \frac{e^x}{x^2}$, the derivative is $f'(x) = \frac{x^2 e^x - 2x e^x}{x^4}$. Find all points where the tangent line to the graph of $y = f(x)$ is horizontal.
3. There are two lines that go through the point $(\frac{1}{2}, -2)$ and are tangent to the graph of $f(x) = x^2$. Find where each of those lines touch the graph.
4. Let l denote the tangent line to $y = x^2$ at the point $P = (3, 9)$. Find the equation of the line through P which is perpendicular to l . (This line is called the normal line.)
5. Compute the following limits.

(a) $\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{\sqrt{x + 2}}$

(b) $\lim_{x \rightarrow 3} \frac{\sqrt{x + 1} - 2}{x^2 - 2x - 3}$

(c) $\lim_{x \rightarrow \infty} 2\sqrt{x + 1} - \sqrt{4x - 1}$

(d) $\lim_{x \rightarrow 3^-} \frac{x^2 + 2x + 6}{2x + 6}$