

EXAM 3 - MATH 151

Friday, March 18

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Two people start from the same point. One walks east at 3 mph and the other walks northeast at 2 mph. How fast is the distance between the people changing after 15 minutes?

2. (a) Find $(f^{-1})'(3)$ if $f(x) = 3 + x^2 + \tan\left(\frac{\pi x}{2}\right)$, $-1 < x < 1$.

(b) Suppose f^{-1} is the inverse function of a differentiable function f and $f(4) = 5$, $f'(4) = \frac{2}{3}$.
Find $(f^{-1})'(5)$.

3. (a) Find the derivative of $f(x) = xe^{-x^2}$.

(b) Find an equation of the tangent line to the graph of $y = \ln \ln x$ at $x = e$.

4. (a) Find y' if $e^{x^2y} = x + y$.

(b) Find y' if $x^y = y^x$.

5. (a) Show that $(\operatorname{sech}x)' = -\operatorname{sech}x \tanh x$.

(b) Find the derivative $f'(x)$ if $f(x) = e^x \operatorname{sech}(2x)$.