Math 180 Midterm 2 Practice Exam

Name:

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1. Compute the following derivatives:
   (a) $f(x) = cos(e^{x^2})$
   (b) $f(x) = (400x^2 + x)^{100}$
2. Compute the derivative of $cos(y) = xy$ in terms of x and y.
3. Let $f(x) = 2x^3 - x + 5$. Find $(f^{-1})'(5)$.
4. Compute the following derivatives:
   (a) $y = sin(x)^{cos(x)}$
   (b) $y = \frac{(x+1)^8}{(3x^2+40)^{10}}$
5. Consider the function $y = x^2$.
   (a) Find the absolute minimum and absolute maximum.
   (b) Construct a function with absolute minimum $y = 3$ and absolute maximum $y = 5$.
6. Consider the function $f(x) = sin(x)$ on the interval $[0, \frac{\pi}{2}]$. What are the critical points? Where is the function increasing? Where is it concave down? Justify your answers.
7. Find y' in terms of x if $xy^2 = sin^{-1}(2x)$.
8. Consider the function $f(x) = e^x + e^{-x}$.
   (a) Compute the derivative.
   (b) Find the critical points.
9. Let $f(x) = sin(2x + 1)$, and let $g(x) = \frac{1}{f(x)}$. What is the domain of f? What is the domain of g? Find $f'(\pi - \frac{1}{2})$ and $g'(\pi - \frac{1}{2})$ or explain why they do not exist.
10. Compute the derivative of x^x and match it to its graph. Justify your answer.