

EMT111 Test III

November 18, 2010

- Find the equation of the line tangent to the graph of $f(x) = x^4 + x^3 + 2x$ at $x = 1$.
- Compute the derivative of the following functions.
 - $f(x) = \frac{\sin x - \cos x}{e^x}$
 - $s(t) = \sec t \tan t$
 - $h(t) = \frac{t^4 + 1}{t^4 + 3}$
 - $f(x) = (x^2 + 1) \sin x + (x^2 + 4) \cos x$
 - $f(x) = e^{\tan x}$
 - $g(x) = \ln(\sec x)$
 - $s(t) = \cos(\sqrt{t^2 + 1})$
 - $g(t) = (t^2 + 2t)^{\sin t}$
 - $f(x) = \tan(e^x)$
 - $s(x) = \arcsin(x^3)$
- Find the absolute minimum and maximum values of the function $f(x) = 4x^3 + 3x^2 - 6x$ on the interval $[-2, 1]$.
- Suppose that $e^{x^2 y^2 - 1} - y = 0$. Find $\frac{dy}{dx}$.
- A storage bin with a ceiling and floor is to be constructed in the shape of a cylinder. The cost of the material used for the two circular surfaces is \$2000 per square foot. The material used for the lateral surface costs \$4000 per square foot. What are the dimensions of the cheapest bin that can be built with a volume of $1000\pi ft^3$?
- Find a point on the curve $x = 2y^2$ closest to $(0, 9)$.
- Find the relative extrema.
 - $f(x) = 1 - 4x - x^2$
 - $f(x) = x(x - 1)^2$
- The minute hand of a certain clock is 4 in long. Starting from the moment when the hand is pointing straight up, how fast is the area of the sector that is swept out by the hand increasing at any instant during the next revolution of the hand?