

NAME:

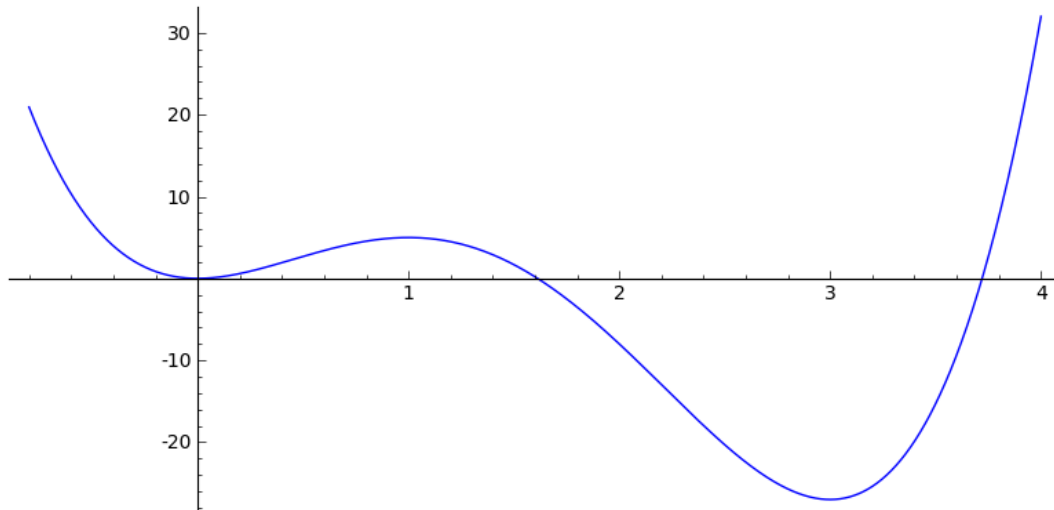
MATH 157

EXAM 2

OCTOBER 15, 2014

INSTRUCTIONS: Calculators, notes, cell phones, or other materials are not permitted. Show all your work: even correct answers may receive little or no credit if a method of solution is not shown.

1. Use the definition of the derivative to calculate $f'(4)$ for $f(x) = \sqrt{x}$. Hint: you do not need to find $f'(x)$, just $f'(4)$.
2. Find the slope of the line tangent to the curve $y = x \sin(x)$ at the point $(\pi, 0)$.
3. Sketch the graph of a function that is continuous at 0 but not differentiable at 0.
4. The graph $y = f(x)$ is shown. Use this graph to sketch the graph of $f'(x)$ on the same axes. Be as accurate as you can with the x -axis intercepts but don't worry about the vertical scale.



5. Differentiate $f(x) = \sqrt{1 + x^2}$.
6. Differentiate $f(x) = \frac{\tan x}{x}$.
7. Use a linear approximation to $f(x) = \sqrt[3]{x}$ to estimate $\sqrt[3]{10}$. Hint: $\sqrt[3]{8} = 2$.
8. The height (in meters) of a rocket t seconds after launch is given by $h(t) = 160 + 160(t - 2) - 4(t - 2)^2$. What is the velocity of the rocket 22 seconds after launch?
9. Use implicit differentiation to find $\frac{dy}{dx}$ if $y \cos(x) = x \cos(y)$.
10. Find an equation for the tangent line to the ellipse $x^2 + 4y^2 = 40$ at the point $(2, 3)$.
11. A zeppelin flying at an altitude of 3km at a speed of 50km/hr passes directly over Gonzaga. How fast is the distance from Gonzaga to the zeppelin increasing when the zeppelin is 5km away (that is, the diagonal from Gonzaga to the zeppelin is 5km)?