TEST 2

Davis Name:
M211 Pledge:

Show all work; unjustified answers may receive less than full credit.

(15pts.) 1. Find $\frac{dy}{dx}$ for the following functions.

a. $y = x^3 - 4x^{2/3}$

b. $y = e^{\sin(x)} + \cos(e^x)$

c. $y = x^2 ln(x)$

d. $y = \frac{2^x}{x^2+x+1}$

e. $y = 3(\tan(x))^3$

(30pts.) 2. A car is worth $P(t)$ at time t, where t is measured in years after 1996.

a. If $P(5) = \$10000$ and $P'(5) = -\$1000$, explain what each of these mean in practical terms.

b. If you take the money from the sale of the car and put it in the bank, then in 2016 you will have $B(t)$ dollars in the bank, where $B(t) = (1.05)^{20}\frac{P(t)}{(1.05)^t}$. Calculate $B'(5)$, and give a practical interpretation of what it means.

(25pts.) 3. State the definition of the derivative, and use that definition to figure out the slope of the tangent line to $y = x^2 - 4x$ at $a = 1$ (show all work, including the calculation of the limit). Sketch a graph of the function together with the tangent line at $a = 1$.

(15pts.) 4. You were so excited to get home for fall break that you traveled the 280 miles from the University of Richmond to your home in 4 hours. If $h(t)$ measures your distance from the University at time t measured in hours, sketch a possible plot of $h(t)$ (there are many possible answers for this, but make sure you label your graph). What is your average velocity over this interval? How could the police use this information together with the Mean Value Theorem to cite you for speeding? Show at least one moment when you were speeding on your graph of $h(t)$ (Assume that the speed limit is 65 mph).

(15pts.) 5. Consider the sketch of the curve $y = f'(x)$ on the board. Sketch possible graphs for $y = f(x)$ and $y = f''(x)$ (make sure you label each graph).