Mathematics 122 Test #2

Name: _____

You are to use your own calculator, no sharing.
Show your work to get credit. This means that if you use your calculator to solve a problem, then you have to write a sentence telling how you used it to do the calculations. (That is if you graphed it and zoomed in then say that is what you did etc.)

1. (20 Points) Compute the derivatives of the following functions (no simplification required):

   (a) $y = 4x^5 - 3x^4 + 7x^2 - 2$

   $y' =$

   (b) $s(t) = 3\sqrt{t}$

   $s'(t) =$

   (c) $w = \ln(z)$

   $w' =$

   (d) $v(r) = -3(r^3 + 2r)^{10}$

   $v'(r) =$

   (e) $E(t) = 3^t$

   $E'(t) =$

   (f) $R(q) = \dfrac{3}{\sqrt{q^2 + 1}}$

   $R'(q) =$

   (g) $f(x) = e^{x^3 + x}$

   $f'(x) =$

   (h) $u(s) = s^2 e^{3s}$

   $u'(s) =$

   (i) $M(r) = \ln(r^3 + 1)$

   $M'(r) =$

2. (10 Points) Compute the following using your calculator

   (a) $\int_{-1}^{3} \frac{2^x}{1 + x^2} \, dx =$

   (b) The average value of $f(x) = \ln(x^2 + 3)$ on the interval $[1, 5]$ _____

3. (10 Points) Find the area between the curves $y = x^2$ and $y = 2x$.

   Area = _____

4. (10 Points) If $f(t)$ is measured in kilometers per hour and t is measured in hours then what are the units of measurement for $\int_0^{23} f(t)\,dt$?.

Units are _____

5. (10 Points) Gasoline is leaking out of a underground storage tank at the rate of $200(.95)^t$ gallons/week, where t is the number of weeks since the leak started. How many gallons of gasoline leaked out of the tank in the first ten weeks after the leek started? _____
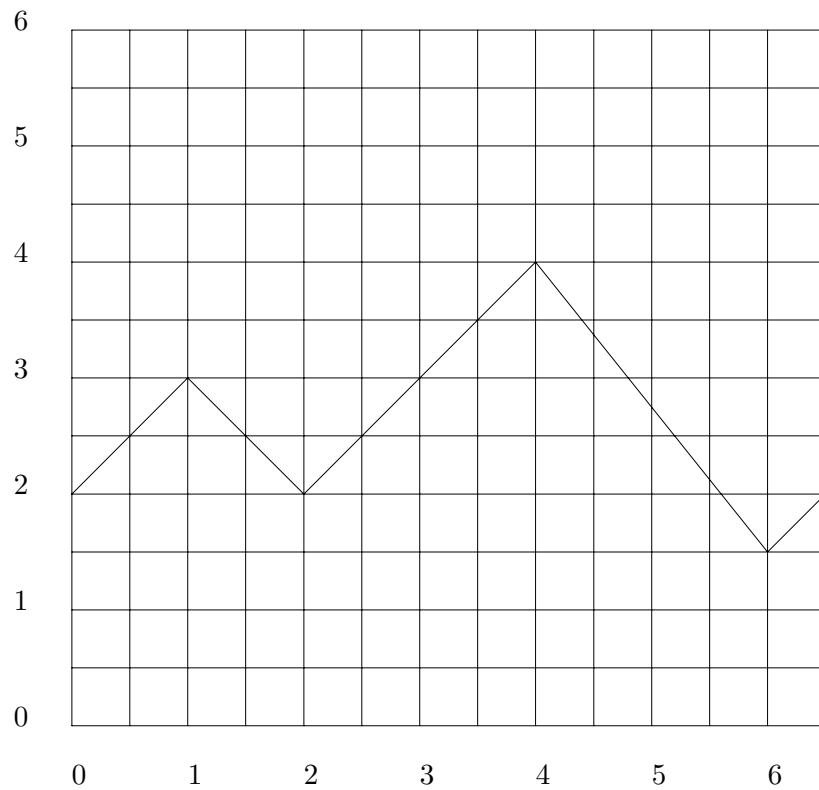
6. (10 Points) A function $f(t)$ has values given by the table:

t	2.5	3.0	3.5	4.0	4.5
$f(t)$	4.0	3.8	3.5	3.1	2.6

Estimate $\int_{2.5}^{4.5} f(t)\,dt$.

$$\int_{2.5}^{4.5} f(t)\,dt \approx \quad\text{_____}$$

7. (10 Points) Below is the graph of $f(t) = F'(t)$ (that is the graph is if the rate of change of F).
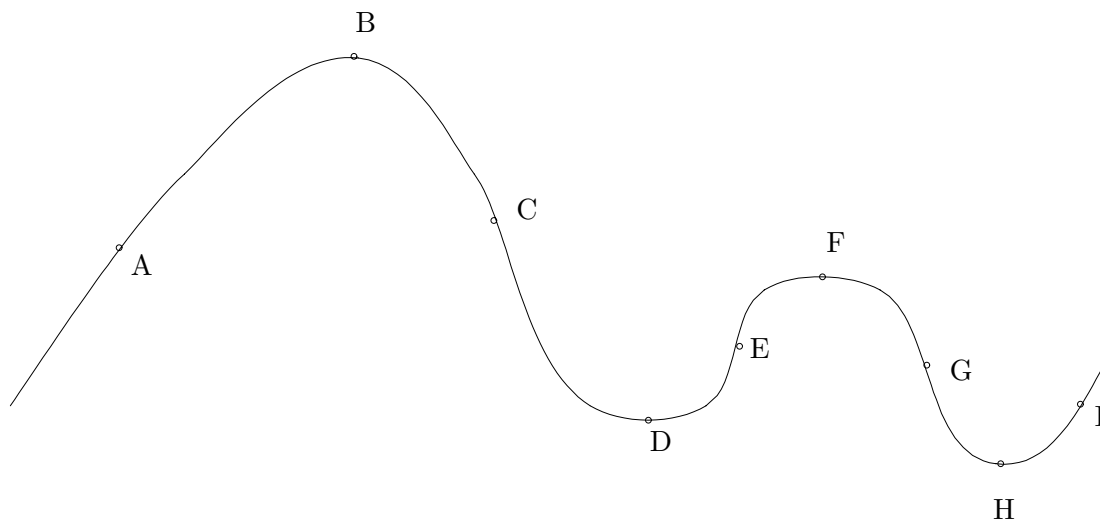

(a) If $F(0) = -2$ then what is $F(5)$? $F(5) =$ _____

(b) How much does F change between $t = 2$ and $t = 6$? _____

8. (10 Points) In the graph below
   (a) Which of the labeled points are critical points?   _____

   (b) Which of the labeled points are inflection points?   _____

9. (10 Points) What is the equation of the tangent line to $y = x^3 - 2x$ at the point where $x = 1$?

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