# Mathematics 122 Test #3   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. (15 points) A student makes a trip home over the Thanksgiving holiday. The speed he drives as a function of time is given in the graph below.

Speed in mph
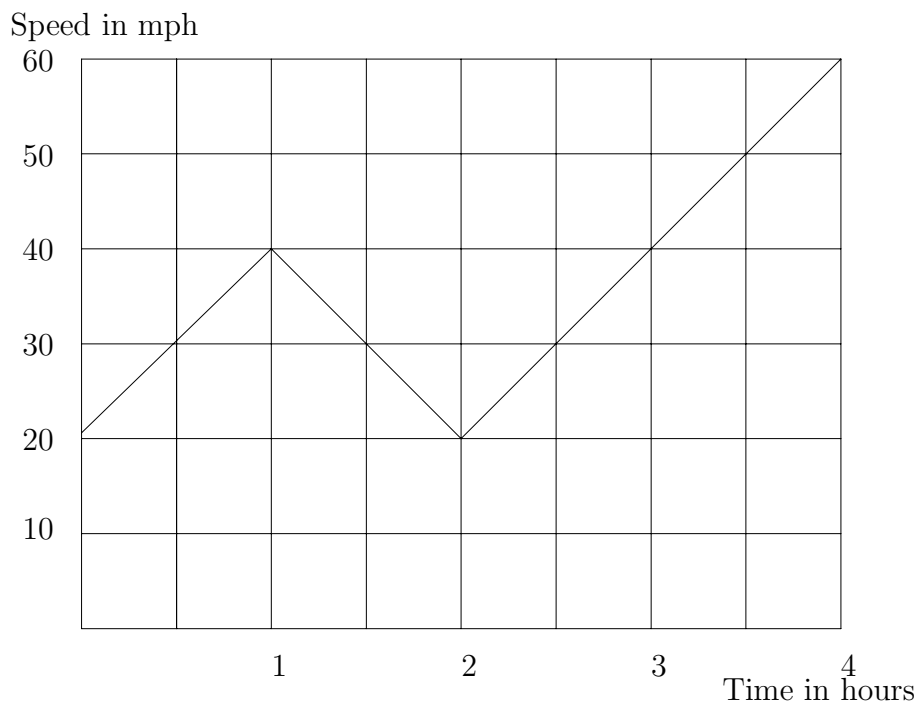
(a) How far was the entire trip (which took four hours).

(b) How much distance was covered in the first two hours?

(c) What was the average speed during trip?

2. (20 points) Compute the following (you should use your calculator)

(a) $\int_1^2 (x^2 + 1)\, dx$ _____

(b) $\int_0^3 5(3^t)\, dt$ _____

(c) $\int_0^3 \dfrac{3 - x}{9 + x^2}\, dx$ _____

(d) The average value of $f(x) = \dfrac{1}{\sqrt{1 + x^2}}$ on the interval $1 \le x \le 4$

_____

3. (15 points) Oil is leaking out of a storage tank at the rate of $r = 20(.9)^t$ gallons per hour where t is measured in hours since the leak started.

(a) How many gallons leak out of the tank during the first 10 hours? _____

(b) If the leak is stopped 24 hours after it started then write down a definite integral that represents the amount of oil that leaked out of the tank during the last 10 hours of the leakage. (You do not have to evaluate the integral.) _____

4. (10 points) If the marginal revenue $R'(q)$ is measured in dollars/gram, then

   (a) What are the units on the definite integral $\int_{100}^{200} R'(q)\,dq$?

                                 Units are? _____

   (b) Give a sentence or two explaining what $\int_{100}^{200} R'(q)\,dq$ represents.

5. (10 points) A function $f(t)$ has values given by the table:

t	1.5	2.0	2.5	3.0	3.5
$f(t)$	4.1	3.8	3.5	3.0	2.4

Estimate $\int_{1.5}^{3.5} f(t)\,dt$.

$$\int_{1.5}^{3.5} f(t)\,dt \approx \underline{\hspace{4cm}}$$

6. (20 points)

Compute the derivatives of the following functions. You don not have to simplify your answers.

(a) $y = 3x^7 - 9x^5 + 12x^3 + 2x - 9$ y'= _____

(b) $R(t) = \dfrac{2}{t^3} - 4\sqrt{t}$ $R'(t) =$ _____

(c) $A = 4(3r^2 + r - 2)^9$ $\dfrac{dA}{dr} =$ _____

(d) $y = 2\pi^4 + e^x$ $y' =$ _____

(e) $v = 3e^{-t^3}$ $v' =$ _____

(f) $y = x^3 e^{2x}$ $y' =$ _____

(g) $h(t) = (5 + e^t)^3$ $h'(t) =$ _____

7. (10 points) What is the tangent line to $y = x^2 - 4x + 3$ at the point where $x = -2$?

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