Test 1

Name: _____

Show your work! Answers that do not have a justification will receive no credit.

1. (25 points) Find the derivatives of the following:

(a) $f(x) = 7x^3 - 9x^2 + 3x - 4.$

$f'(x) =$

(b) $V = 4s^2 - 3\sqrt{s^3}$

$\frac{dV}{ds} =$

(c) $h(t) = \sqrt{4t^2 + 1}$

$h'(t) =$

(d) $H(\theta) = \sin\theta + 2\cos\theta + 3\tan\theta$

$H'(\theta) =.$

(e) $D = 2 \cdot 4^{\frac{3}{5}} + \frac{7}{t^3}$

$\frac{dD}{dt} =$

(f) $P(n) = P_0(1.09)^n,$ (where P_0 is a constant.)

$P'(n) =.$

(g) $A(\alpha) = 5\cos^3(\alpha)$

$A'(\alpha) =$

2. (10 points) Measurements of the temperature (in degrees F) of a cup of hot water are made every 10 seconds. Some of the measurements are given in the table. What (approximately) is the rate of of the temperature when $t = 100$secs?

time	Temp.
80	93.50
90	93.15
100	92.80
110	92.45
120	92.10

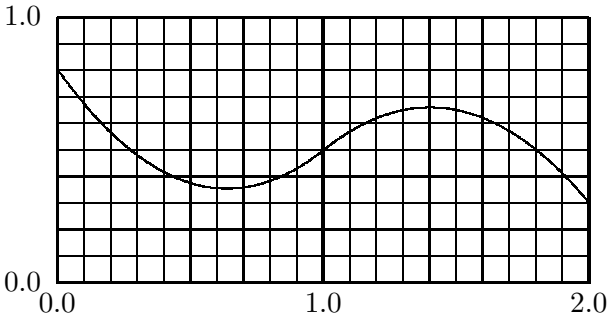
3.(10 points) Let $V(s) = s^3 + s$. Write the microscope equation at the point where $s = 2$.

4. (15 points) Fill in the blanks.
(a) If $f(4) = 5$ and $f'(4) = 6$ a reasonable estimate of $f(4.2)$ is _____.

(b) If $g(5) = 6$ and $g'(5) = .4$ a reasonable estimate of $g(4.5)$ is _____.

(c) If $h(3) = .5$ and $h'(3) = 2$ a reasonable estimate of $h($_____$)$ is 0.

5. (20 points) Let $y = f(x)$ have the graph as shown. Then answer the following.



(a) What is $f'(1.9)$? _____

(b) For what values of x is $f'(x) = 0$? _____

(c) On what intervals is $f'(x)$ negative? _____

(d) Draw your own axis and sketch a graph of the derivative $y = f'(x)$.

6. (20 points) A snow ball is brought into a warm room. Let $V(t)$ be the volume of the snow ball (measured in cubic inches) after t minutes after it was brought into the room. It is known that the volume satisfies the rate equation

$$V'(t) = -\frac{1}{3}V(t)^{\frac{2}{3}}.$$

(a) Five minutes after the snow ball was brought into the room its volume is 8in^3. Write the microscope equation relating ΔV and Δt at the point where $t = 5$.

(b) Using the data form part (a) estimate the volume the snowball when $t = 5.3$.

(c) Again using the data from part (a) estimate the time when the volume was 9in^3.