(12)   1.   Suppose $V(x) = 3 \arcsin(2x)$.

a) What is the domain of V? (Your answer should be an interval.)

b) What is the range of V? (Your answer should be an interval.)

c) Give an explicit formula for the function inverse to V.

d) Compute $V\left(\frac{1}{2}\sin\left(\frac{7\pi}{4}\right)\right)$.

(16)   2.   Compute $\dfrac{dy}{dx}$: (Do <u>not</u> simplify your answers!)

a) $y = \arctan\left(x^3 + 7\right)$

b) $y = \ln\left(\dfrac{x^2 + 1}{x + 2}\right)$

c) $y = 7x^{\left(x^x\right)} + 5\left(x^x\right)^x$

(18)   3.   Perform the indicated integrations. Give explicit numerical answers but leave such constants as $\sqrt{7}$ and π without further approximation.

a) $\displaystyle\int_0^{1/\sqrt{2}} \frac{x}{\sqrt{1-x^4}}\, dx$

b) $\displaystyle\int_1^2 \frac{dx}{\sqrt{x}+x}$

c) $\displaystyle\int_0^{\pi/3} \tan x\, (\sec x)^2\, dx$

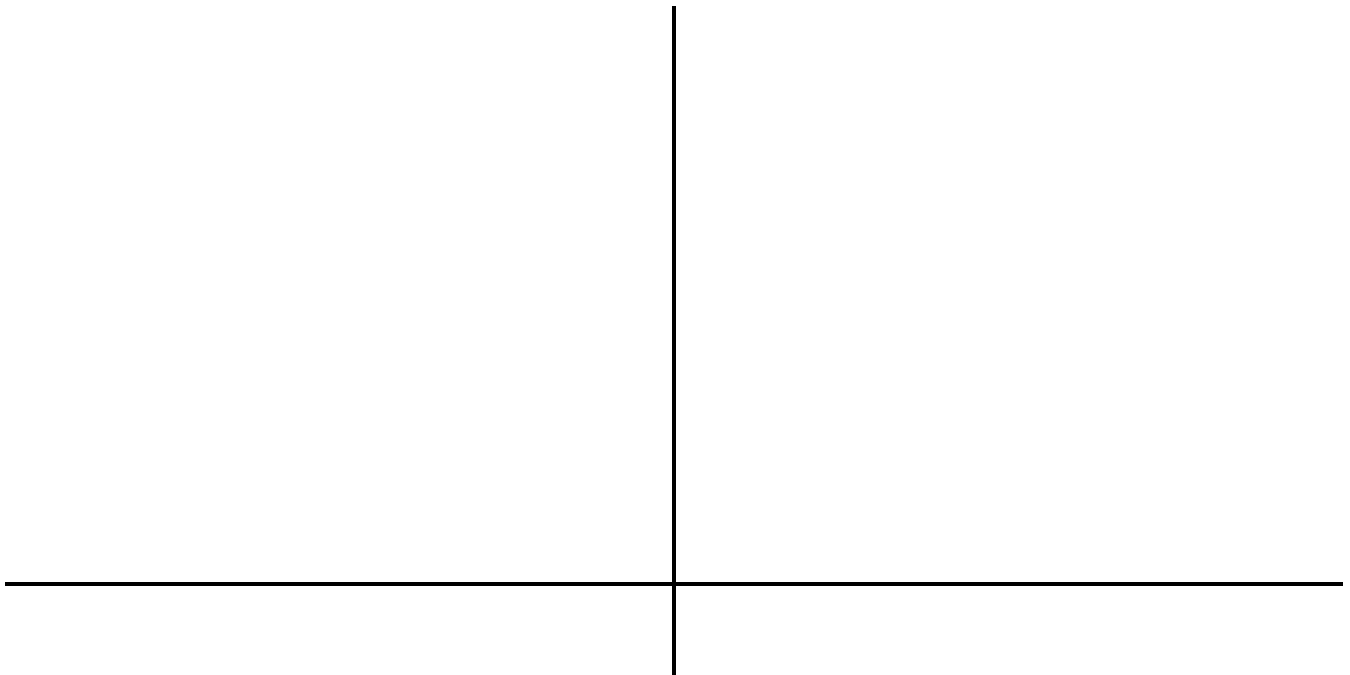(18)   4.   Consider the function $G(x) = \ln(1 + x^2)$.

a) What is $\lim\limits_{x \to \infty} G(x)$?

b) What is $\lim\limits_{x \to -\infty} G(x)$?

c) Compute $G'(x)$ carefully. Where is $G'(x) = 0$?

d) Compute $G''(x)$ carefully. Where is $G''(x) = 0$?

e) Use all of the information above to sketch the graph of $y = G(x)$. **Be sure to indicate explicitly** any local extrema or inflection points, all regions of increase and decrease, and all regions of concavity.

(12)   5.   A small meteorite falls into the rapidly flowing Raritan River. One hour later, the meteorite is 300°C hotter than the river. One hour after that measurement, the meteorite is 100°C hotter than the river. How much hotter than the river was the meteorite when it first hit? (Assume that the rate of temperature decrease is directly proportional to the difference in the temperatures of the river and the meteorite.)

(24)   6.   Integrate:

a) $\int x^2 \cos{(ax)}\, dx$ ("a" is a constant here.)

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b) $\displaystyle\int \frac{dx}{4 + 9x^2}$

c) $\displaystyle\int \frac{dx}{\sqrt{x^2 - 2x - 3}}$

d) $\displaystyle\int e^{3x} \sin 5x\, dx$ Continue your work on the next two pages if you wish.

More space for your work.

More space for your work.

EXAM 1 for MATH 192

October 11, 1993

NAME (*please print*):————————————————————

SIGNATURE: ————————————————————

Do all problems, in any order.

Show all your work. Full credit may not be given for an answer alone.

$$
\text{NO} \left\{ \begin{array}{c} \textbf{books} \\ \textbf{notes} \\ \textbf{calculators} \end{array} \right\} \textbf{ of any kind may be used on this exam.}
$$

Problem Number	Possible Points	Points Earned:
1	12	
2	16	
3	18	
4	18	
5	12	
6	24	
Total Points Earned:		

All answers **should** be left in "unsimplified" form – that is, $15^2 + (.07) \cdot (93.7)$ is preferred to 231.559. You are expected to know, however, simple values of transcendental functions such as $\cos\left(\dfrac{\pi}{2}\right)$ and $\exp(0)$.