MATH 122B AND 125
ADDITIONAL REVIEW PROBLEMS

1. Let $f(x)$ be a continuous function such that $f(1)=3$, $f(7)=6.059$, and $f'(x)=\ln\left(\frac{x}{x^2+2}\right)+2$.

a) What is the domain of $f'(x)$?

b) Find $\lim_{x\to\infty} f'(x)$.

c) Find $\lim_{x\to 0^+} f'(x)$.

d) For what value(s) of x does $f(x)$ have a horizontal tangent line (if at all)?

e) Is $f(x)$ invertible on $(0,\infty)$?

f) For what value(s) of x does $f(x)$ have a local minimum (if at all)?

g) Does $f(x)$ have a global maximum on the interval $[9,12]$? If so, what is the *x*-coordinate?

h) Find the equation of the tangent line to $f(x)$ at $x=1$.

i) If we restrict *x* to the interval $(1/2,5)$, find $\left(f^{-1}\right)'(3)$.

j) Does $f(x)$ have an *x*-intercept to the right of $x=7$?

k) Does $f(x)$ have a horizontal asymptote?

l) Find $f''(x)$.

m) Find $\lim_{x\to\infty} f''(x)$.

n) For what value(s) of x does $f(x)$ have an inflection point (if at all)?

o) Over what interval is $f(x)$ concave up?

p) If your line in part h) is used to estimate $f(1.2)$, would we get an under or over estimate of the true value of $f(1.2)$? How do you know?

q) Find the exact value of $\int_1^7 f'(x)dx$.

r) Find the exact value of $\int_3^5 f''(x)dx$.

s) Use the Fundamental Theorem to estimate $f(5)$.

t) If we estimated $\int_2^4 f'(x)dx$ using a left hand sum with 20 subdivisions, would we get an under or over estimate of the true value of the integral? How do you know?

u) If we estimated $\int_2^4 f(x)dx$ using a left hand sum with 20 subdivisions, would we get an under or over estimate of the true value of the integral? How do you know?

v) Find $h'(x)$ if $h(x) = \int_1^x f'(t)dt$.

w) Let $g(x) = (f(x))^3$. Find $g'(7)$.

x) Suppose $f(x)$ is the temperature of some object in degrees when x is measured in hours. What are the units of $f'(x)$? Find $f'(3)$ and give a practical interpretation.

y) Suppose $f'(x)$ is measured in degrees per hour. What are the units of $\int_1^4 f'(x)dx$? Give a practical interpretation.

z) That's all.