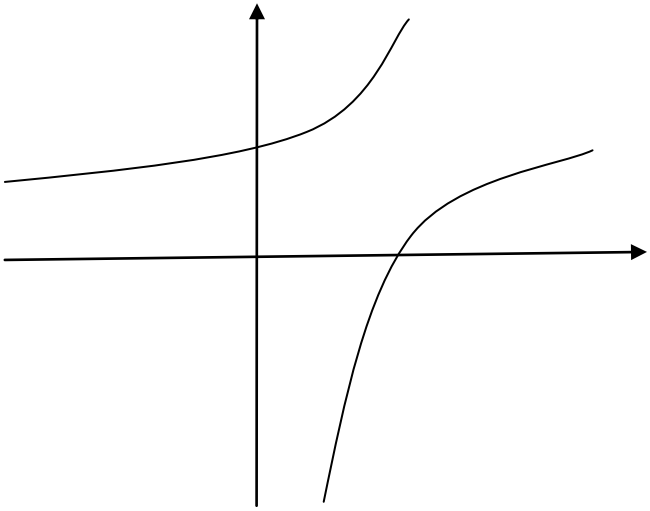
Calculus I, Math 2255 Name_____*KEY*_____
Abedi, Spring 2011 Pretest 1

1. Find a formula for the inverse of $f(x) = e^x + 2$. (16)

i) Graph both the function f and f^{-1}. ii) What is $f^{-1}(3)$? …0 iii) f is odd, even, or neither Neither

$$y = e^x + 2 \rightarrow x = e^y + 2 \rightarrow e^y = x - 2 \rightarrow y = \ln(x - 2)$$



2. A function is given by a table of values. i) Is the function one-to-one.--------*Yes*----------. (12)

x	4	5	6	7	8	
$f(x)$	20	41	65	79	100	

ii) Use regressions to find a model for the above function and approximate f (10).

Linear Regression…$y = 19.8x - 57.8$……

f(10) ≈ 140.2……

3. Find the domain of $f(x) = \dfrac{x+2}{\sqrt{x-4}}$. ----------(4,∞)---------- (8)

What is the value of $f(6)$? $\frac{8}{\sqrt{2}} \cong 5.66$ What are (is) x-intercepts of f -----DNE--------

4. Let $f(x) = x^2 + 2x$ and $g(x) = \sqrt{x} + 3$. Find each of the following functions and its domain. (8)

a) $\frac{f}{g}$ -----$\left(\frac{f}{g}\right)(x) = \frac{x^2+2x}{\sqrt{3}+3}$------ ---------, Domain of $\frac{f}{g}$ ----------[0, ∞)---------

b) $g \circ f$ --- $g \circ f(x) = \sqrt{x^2 + 2x} + 3$-------, domain of $g \circ f$ ------$(-\infty, -2]U[0, \infty)$-------

5. Sketch the graph of $y = 2 + \sin^2 x$. (5)

6. The doubling time of certain bacteria is approximately 5 hours. Suppose that there are initially 80 bacteria i) What is the size population after *t* hours. ii) Estimate the size of population after 8 hours. iii)Estimate the time for the population to reach 140 (12)

$A = A_0\left(2^{\frac{t}{a}}\right)$

i) $A = 80\left(2^{\frac{t}{5}}\right), \rightarrow A = 80\left(2^{\frac{8}{5}}\right) \cong 245.52$

ii) $140 = 80\left(2^{\frac{t}{5}}\right) \rightarrow \frac{140}{80} = 2^{\frac{t}{5}} \rightarrow \ln\left(\frac{7}{4}\right) = \frac{t}{5}\ln(2) \rightarrow t = \frac{5\ln\left(\frac{7}{4}\right)}{\ln(2)} \cong 4.04$

7. Find the exact value of each of the following. (12)

a) $\ln(\ln e^{-4})$ ------DNE----- b) $\log_{64} \frac{1}{8}$ $\frac{-1}{2}$ c) $\ln e^{8\pi^2}$ $8\pi^2$ d) $5^{\log_5 2x}$ $2x$

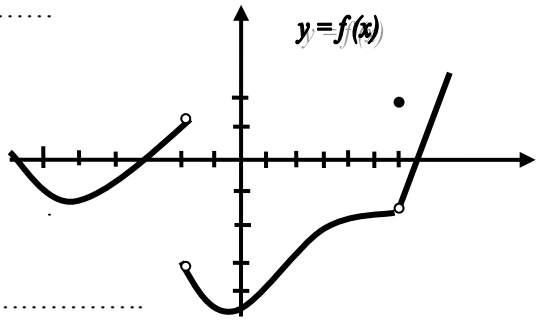
8. Solve the equation $e^{5x+8} = 40$. (10)

$e^{5x+8} = 40 \rightarrow \ln(e^{5x+8}) = \ln(40) \rightarrow 5x + 8 = \ln(40) \rightarrow x = \frac{-8+\ln 40}{5} \cong -0.862$

9. Express the function $f(x) = \sin^3(\sqrt{x})$ in the form $g \circ h$. (5)

Let $h(x) = \sqrt{x}$ & $g(x) = \sin^3 x$

10. Refer to the function $y = f(x)$ to your right. (12)



i) Domain of f = ……$(-\infty, -2) \cup) -2, \infty)$……

ii) Range of f = ……[-4.5,∞)……..

iii) $f(0)$ = …−4.5…… $f(6)$ = …2……

iv) For what value(s) of x, $f(x) = -3$……$x = 2$……

v) On what interval(s) the function is increasing?

……$(-5, -2) \cup (-1,6) \cup (6, \infty)$……..

vi) On what interval(s) the function is decreasing?

……$(-\infty, -5) \cup (-2, -1)$……