College of the Holy Cross, Fall 2016
Math 135, Section 1, Midterm 1
Friday, September 23

Your Name: _____

Instructions: Please write your answers in the boxes provided, and show work on the test pages. Use the back of the preceding page if you need more space for scratch work. The numbers next to each part of the questions are their point values.

Please do not write in the space below

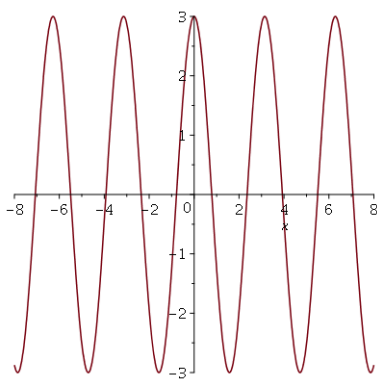| Problem	Points/Poss
I	/ 20
II	/ 25
III	/ 20
IV	/ 15
V	/ 20
Total	/100

I. Match the plots below with the following formulas. Note that there is an extra plot that does not match any of these formulas.

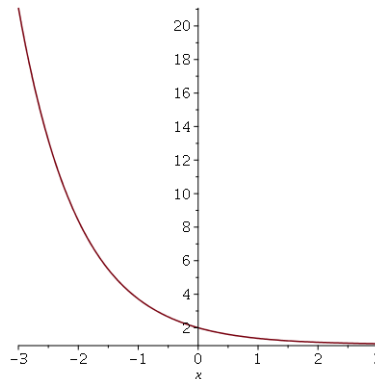(5) A) $y = (x + 1)^2 + 2$ is Plot: _____

(5) B) $y = 3\cos(2x)$ is Plot: _____
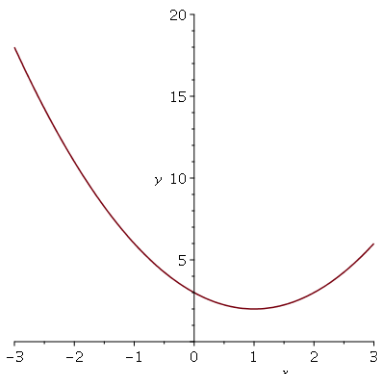
(5) C) $y = 1 + e^{-x}$ is Plot :_____
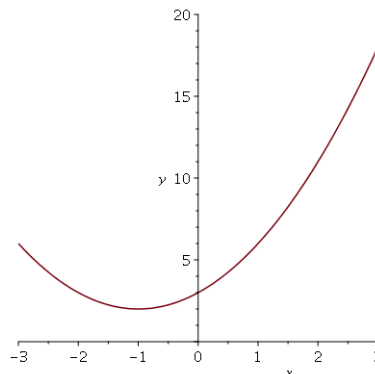
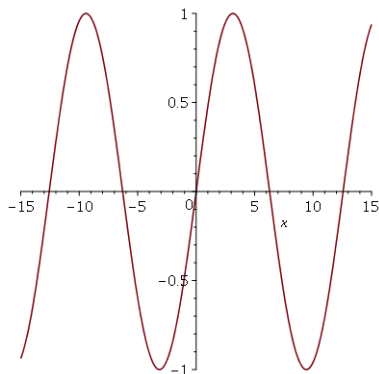(5) D) $y = \sin(x/2)$ is Plot: _____

Plot 1:

Plot 2:

Plot 3:

Plot 4:

Plot 5:

II. The manager of a furniture factory has collected the following data for the cost of manufacturing chairs.

# Chairs (per day) C	Manufacturing Cost (in dollars) M
100	2400
150	3100
250	4500
300	5200

(10) A) Given that M is a linear function of C, determine a formula for it, using the correct labeling of the variables (that is, an answer expressed in terms of x and y will not receive full credit).

Cost function:

(5) B) How much additional cost is incurred by manufacturing each additional chair?

Additional cost:

(5) C) What does the M-intercept represent in terms of cost?

(5) D) Using your formula, determine how much it will cost to produce 350 chairs per day.

Cost:

III. Given $f(x) = x^2 - 6x + 1$ and $g(x) = \sqrt{3x - 2}$, answer the following questions.

(10) A) Find the domain of $f(x)$ and the domain of $g(x)$.

Domain of f:

Domain of g:

(5) B) What is the domain of the function $g(x)/f(x)$?

Domain of $g(x)/f(x)$:

(5) C) Find the function $(g \circ f)(x)$.

IV. Answer the following questions.

(5) A) Find all values of x in $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$ for which $|\tan x| > 1$.

Values of x: [   ]

(5) B) If $\sin\theta = \dfrac{2}{3}$ and $\dfrac{\pi}{2} < \theta < \pi$, give the exact value of $\cos\theta$.

$\cos\theta$: [   ]

(5) C) Express as a single logarithm: $\dfrac{1}{2}\ln 5 - 4\ln 2 + \ln 10$. (This means your answer should be in the form $\ln(\text{some exact number})$, not a decimal approximation.)
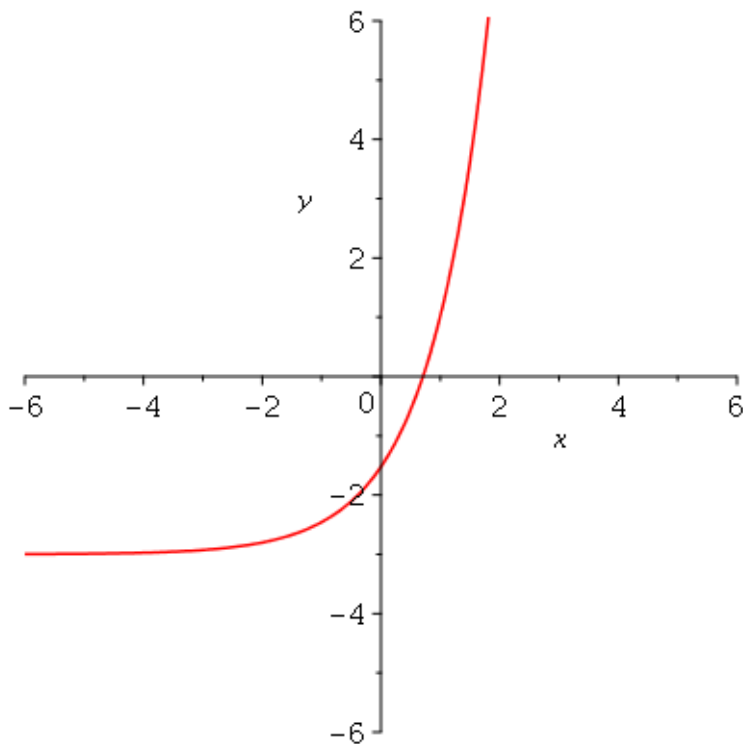
Single logarithm: [   ]

Figure 1: $y = f(x)$ in Question V.

V. Consider the function $f(x) = \dfrac{1}{5}e^{x+2} - 3$.

(10) A) Given that f is one-to-one, find a formula for the inverse function of f.

$$f^{-1}(x) = \boxed{}$$

(10) B) The plot above shows the graph of the function $y = f(x)$. Sketch in the graph $y = f^{-1}(x)$ on the same set of axes. Label one point on each graph with its coordinates.