

Name _____

Student I.D. _____

Math 1210-2
Practice Exam #1
September 12, 2007

Please show all work for full credit. This exam is closed book, closed note, closed calculator. There are 100 points possible, as indicated below and in the exam. Since you only have 50 minutes you should be careful to not spend too long on any one problem. Good Luck!!

Score

POSSIBLE

1 _____ 20

2 _____ 20

3 _____ 30

4 _____ 20

5 _____ 10

TOTAL _____

1) Shown below is the graph of $y=\cos(x)$. Add the following sketches to the picture. For parts (b),(c), explain in words how the graphs are related to the original graph of $y=\cos(x)$.

1a) $y = \sin(x)$.

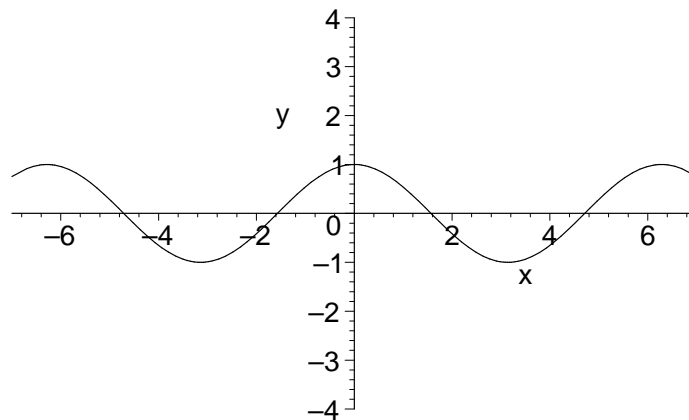
(5 points)

1b). $y = \cos(x + 2) - 3$

(5 points)

1c) $y = 3 \cos(2x)$.

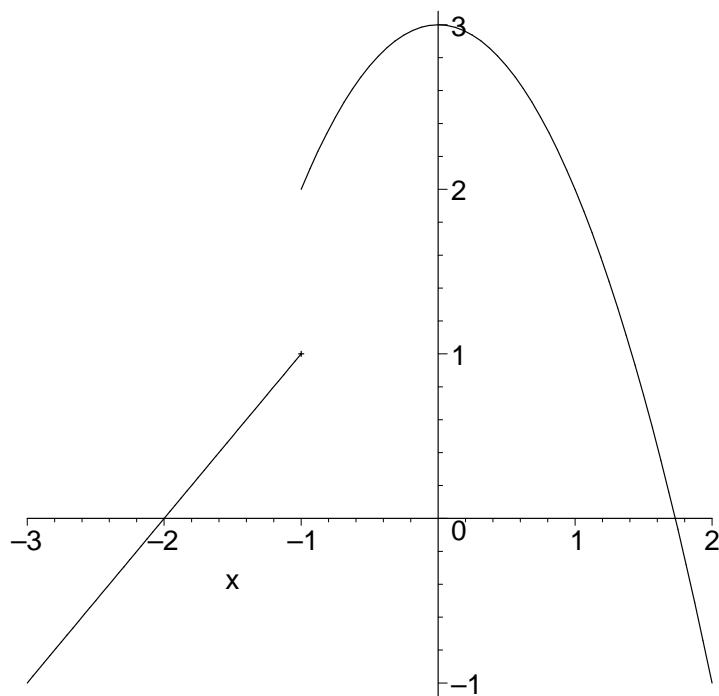
(5 points)



1d) Use the addition angle formula for $\cos(\alpha + \beta)$ to show that the graph of $y = \sin(x)$ (that you sketched in part (a)) is a translation of the graph $y = \cos(x)$ by $\frac{\pi}{2}$ to the right.

(5 points)

2) Here the graph of a function $y=f(x)$:



Use the graph to deduce the following limits. If the limit does not exist, write DNE.

2a)

$$\lim_{x \rightarrow (-1)^+} f(x)$$

(5 points)

2b)

$$\lim_{x \rightarrow (-1)^-} f(x)$$

(5 points)

2c)

$$\lim_{x \rightarrow (-1)} f(x)$$

(5 points)

2d)

$$\lim_{x \rightarrow (-2)} f(x)$$

(5 points)

3a) Use the limit definition of derivative to find the slope function for the graph $y = x^3 + 2x$. (15 points)

3b) Check your work in part (3a), using the rules we learned for differentiating polynomials. (5 points)

3c) Find the equation of the tangent line to the graph $y = x^3 + 2x$, at the point on the graph with x-coordinate 1. (5 points)

3d) Where does the line you found in (3c) intercept the x-axis? Where does it intercept the y-axis? (5 points)

4) A speedometer of a car moving along a road has recorded car's (positive) velocity in miles per hour, from time 0 to 1 hour, and the data fits the following function:

$$v(t) = 60 + 2t - \frac{1}{30}t^2.$$

4a) How far does the car travel in that hour?

(10 points)

4b) When is the car traveling the fastest? And what is its velocity then? (Hint: its acceleration will be zero at that instant!)

(10 points)

5) For $f(x) = x^2 + 1$ and $g(y) = \sqrt{y}$, consider x 's and y 's which lie in the open intervals of points satisfying

$$|x - 1| < 0.1, \quad |y - 4| < 0.1$$

5a) What are the best estimates you can make for the values of $f(x)g(y)$ based on this information? (You don't need to simplify your answer, which should be an open interval containing the number $4 = f(1)g(4)$.)

(5 points)

5b) What are the best estimates you can make for $f(x)/g(y)$? (Your answer should be an open interval containing $1 = f(1)/g(4)$.)

(5 points)