Precalculus and Modeling, 2007-2008 This belongs to: _____

Spring 2008 Third Trimester Review Sheet *Exam: Wednesday, June 4, 2008 1:30 pm*

Disclaimer: This is intended to be part of your exam preparation. You should also study your class notes, textbook, homework, and previous tests and quizzes.

1. Without using your TI, sketch a graph of the following functions. Label important points and features (intercepts, asymptotes, domain, etc.). Be able to briefly explain why each graph appears the way it does.

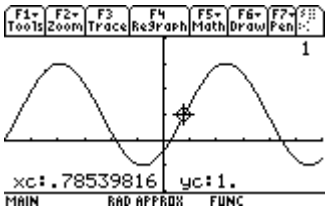
a. $y = 2\cos\left(\frac{\pi x}{3}\right)$ b. $y = \frac{5x+2}{2x-1}$ c. $y = \frac{1}{2}(x-3)^2(x+4)(1-x)$

d. $f(x) = \frac{1}{2}\tan\left(\frac{x}{2}\right)$ e. $f(x) = \frac{x-4}{2x^2-3x-2}$ f. $f(x) = \frac{2x^2-8}{x^2+x-6}$

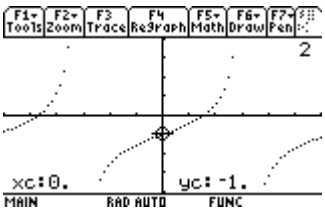
g. $y = 4\sec(x-\pi)$ h. $y = -\sin(4x+\pi)$ g. $y = 2x^3 - x^2 + 3x$

2. Give an equation for each graph. Tick marks represent one unit.

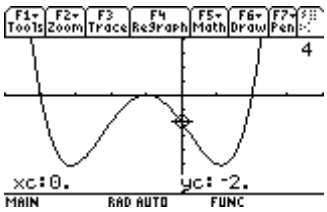
a.



b.



c.



3. Solve for x. When appropriate, you should use analytical methods (i.e. algebra). For trig equations, give exact answers where possible. Use TI appropriately.

a. $\tan\left(\frac{x}{3}\right) - 1 = 0$ b. $\tan^2(x) - \sec(x) - 1 = 0$ c. $4\sin^2 x - 12\sin x - 7 = 0$

d. $3.5\cos\left(\frac{\pi}{6}(x+2)\right) + 4 = 5$ e. $\sin(2x) = \cos x$ f. $\sin(3x)\cos(3x) = \sin^2(3x)$

4. The electricity supplied to your house is called "alternating current" because the current varies sinusoidally with time from its maximum at $i = 5$ amperes to its minimum at $i = -5$ amperes. The frequency of the sinusoid is 60 cycles per second. Suppose that at time $t = 0.01$ seconds, the current is at its maximum.
   a. Make a sketch showing current versus time, and state the period of this graph.
   b. Write an equation that expresses current in terms of time.
   c. When will the current first be 3 amperes?

5. You are taking a picture of two objects whose outer edges are 7 meters apart. You are 6 meters from one of the objects and 5 meters from the other.
   a. What angle in degrees must be covered by the camera to include both objects in the picture?
   b. What is the change in the angle if you are move so that you are an additional meter away from each object?

6. If $\cos t = a$ and $\frac{3\pi}{2} < t < 2\pi$, find each of the following in terms of a:

   a. $\tan(t)$ b. $\sin(t+\pi)$ c. $\cos\left(t+\frac{\pi}{6}\right)$

7. You are standing on a street in New York looking up at the top of a skyscraper, and you measure the angle of elevation to be 38º. You then walk one block further away (440 ft) and find that your new angle of elevation to the top of the building to be 28º. How far away from the building were you when you made your second observation? (adapted from *Trigonometry* by McKeague)

8. You and your friend are in separate cars riding back home. You come to the fork in the road where the two of you separate, and the angle between the two roads is 65º. You both leave the intersection of the roads at 2:00 pm. You are traveling 50 mph, while your friend is traveling 30 mph. (Don't worry…the speed limit is 55 mph. ☺) How far apart are you at 2:30 pm? (adapted from *Trigonometry* by Stewart, et. al.)

9. The equation that gives the brightness of the variable star Zeta Gemini as a function of time is $B(t) = 3.8 + 0.2\sin\left(\frac{\pi}{5}t\right)$. What do the constants and coefficients represent in the context of the problem?

   (adapted from *Algebra and Trigonometry* by Stewart)

   3.8 tells you . . .

   0.2 tells you . . .

   $\frac{\pi}{5}$ tells you . . .

10. Write the equation of the polynomial through (2,7) and having the following zeros, or roots:

Root/Zero/*x*-intercept:	1	0	-2
... with multiplicity	3	1	2

11. Write the equation of a rational function with vertical asymptotes at -1 and 2, zeros at 1 and -2, and a horizontal asymptote at $y = 3$.