Pre-Calculus Problem of the Week Name _____

DUE NO LATER THAN 12/09/09 AT 8:00 AM

SOLUTIONS TO 12/02/09 POW

Each problem below is worth one point, with the exception of number 9. Where appropriate, show the work that leads to your answer to receive credit. You may complete this POW directly on this sheet.

1. Evaluate $\lim_{x\to 3}\frac{x-3}{x^2-9}=\lim_{x\to 3}\frac{1}{x+3}=\frac{1}{6}$

2. State the value(s) of x where $f(x)=\frac{x^2-x}{x^2+x}$ is discontinuous. $f(x)=\frac{x(x-1)}{x(x+1)}$

   f(x) is discontinuous at x = 0 and x = -1.

3. Find the value of a which makes $f(x)=\begin{cases}2x-3 & x\ge 2\\ 4x+a & x<2\end{cases}$ a continuous function.

   $2(2)-3=4(2)+a\to 1=8+a\to a=-7$

4. Evaluate $\lim_{a\to 0}\frac{\left[2(x+a)^2-3\right]-\left[2x^2-3\right]}{a}$ $\quad f(x)=2x^2-3\to f'(x)=4x$

5. If $f(x)=3x^2-4x+1$, find the average value of f(x) on the interval $[-1,1]$.

   $\frac{1}{1-(-1)}\int_{-1}^{1}(3x^2-4x+1)dx=\frac{1}{2}(x^3-2x^2+x)\Big|_{-1}^{1}=\frac{1}{2}(0-(-4))=2$

6. If $s(t)=t^5-2t^3+2t-1$, find $a(2)$.

   $v(t)=5t^4-6t^2+2\to a(t)=20t^3-12t\to a(2)=160-24=136$

7. If $f(x)=(x^2-4x+3)(2x^2-5x+1)$, find $f'(x)$. There is no need to simplify your answer.

   $f'(x)=(2x-4)(2x^2-5x+1)+(4x-5)(x^2-4x+3)$

8. If $f(x)=(x-3)^4(2x+1)^3$, find the value(s) of x which solve $f'(x)=0$.

   $f'(x)=4(x-3)^3(2x+1)^3+3(2x+1)^2(2)(x-3)^4$

   $f'(x)=[2](x-3)^3(2x+1)^2[2(2x+1)+3(x-3)]$

   $f'(x)=2(x-3)^3(2x+1)^2(7x-7)$

   $0=2(x-3)^3(2x+1)^2(7x-7)$

   $x=3,\frac{-1}{2},1$

9. (worth 2 points) Complete the indefinite integral: $\int(x^2+1)^2\,dx$

   $\int(x^2+1)^2\,dx=\int(x^4+2x^2+1)dx=\frac{1}{5}x^5+\frac{2}{3}x^3+x+C$

PROBLEM OF THE WEEK DUE 12/09/09

Write down each of the following:

1. The Law of Cosines Formula

2. The Law of Sines Formula

3. The Product Rule for finding a derivative

4. The Quotient Rule for finding a derivative

5. The cross product of two vectors.

For problems 6, 7, 8, u = ai + bj + ck and v = di + ej + fk

6,7. The dot product of two vectors (both formulas)

8. The sum of an infinite geometric series whose common ratio is a proper fraction.

9. The limit definition of the first derivative.

10. Given $h(x) = f(g(x))$, find $h'(x)$.