SONGS FOR CALCULUS (most of the songs are by Ms. Lois Goldstein. "Feel free to use any of these - sing loud and smile!")

1. **Holes, zeros & vertical asymptotes**
Tune: "Yankee Doodle Dandy"

If you're looking for a zero
Hole or just an asymptote
Factor upstairs and the downstairs too
These are the rules you should quote

If you locate any factor
Top and bottom must agree
Then you know you've found a hole or you can even call it
Remov'ble discontinuity

If a factor makes it nada
Only in the part up high
Then the function has a zero so
An x-intercept you will spy

If a number makes it zero
Only underneath the bar
Let x equal that same number which is just your V.A.
Now you're an algebraic star!

2. **Discontinuities**
(Tune: "Three Blind Mice")
Jumps in graphs, jumps in graphs
Empty holes, empty holes
A vertical asymptote might appear
If the pencil's picked up it is mighty clear
Whenever that happens I tell you dear
The function's not continuous

3. **Oscillating graphs**
Tune: "Frre Jacques"
Oscillation, (sing every line twice)
Never touch,
Sine x over x
There's a hole

Oscillation
Whoop dee doo
Sine one over x
Up and down

4. **Horizontal asymptotes**
Tune: "Do Re Mi"
Horizontal asymptotes
Not as tough as you might think
Look to right, then look to left
Don't forget the missing link
Y approaching value k
Facts you'll need to know in May
Keep this concept in your mind
And the H.A.'s you will find!

5. **Definition of derivative**
Tune: "Pop Goes the Weasel"
Eff prime is the limit of x
As h approaches zero
A quotient which you've got to love
You'll be a hero!

It's eff of x plus h minus
Eff of x you see
Put it all on top of h
Don't you agree?

Math is neat for everyone
For every girl and boy
Derivatives are so much fun
You'll jump for joy!

6. **Rules for derivatives**
Tune: "Row, row, row your boat"
[think y= u/v]
Vee dee you dee ex,
minus you dee vee
The quotient rule's fine,
now put in a line
Below you square the vee.

Eff of gee of x, here's a handy tool
Eff prime of gee times gee prime of x
The chain rule is so cool.

Constant multiples,pull them in or out
Root two or three, a pi or a "c"
They make you want to shout! (Hey!)

7. **Distance, velocity & acceleration**
Tune: "Oh, Susannah"
You start out with the position
It is known as s of t
You then take the derivative
To get velocity.
Do it over
You know that you will find
Oh yes acceleration
Which will really blow your mind!

8. **The Mean Value Theorem**
Tune: "From the Halls of Montezuma"
If a function is continuous
On a closed set "a" to "b"
And it's also differentiable
On the open set "a" "b"
You can always find a "c" inside
Such that f prime at point c
Is equivalent to just the slope
Of the line from A to B.

9. **Derivatives and graphs**
Tune: "Yankee Doodle"
A positive derivative means that the graph is rising,
And if it's less than zero, the result is not surprising.

Chorus: Going up or going down, it really is quite easy
Calculus is so much fun, it never makes you queasy.

Concavity is such a blast, just look at double prime,
If positive, it's concave up, and that will suit you fine. (Chorus)
Now you turn it on its head, until it's concave down,
Negative f double prime, it's kind of like a frown. (Chorus)

10. **Separation of variables**
Tune: "Itsy Bitsy Spider"
First you take the x's, put them in a row
Then the y's and dy's, going with the flow
Integrate both sides, I'm sure you will agree
Just don't be too hasty, remember the "plus C"!

11. **Integral of $\sin^2 x$ and $\cos^2 x$**
Tune: "Jingle Bells"
In calculus I think
I will not make a stink
When integrating stuff
That really isn't tough.

I'm given sine squared x
It's followed by dx
Just listen to Mr. B
We're practically home free
Oh!

One half x, one half x
Then put in a dash
Just write one fourth sine two x
You know that you're a smash

Oh - don't forget - add the C
You might miss the bus
In the case of cosine squared
Just change it to a plus.
Hey!

11. **CALCULUS is Cool**
Tune: Jingle Bells By Liz B
Derivatives we find-
The power rule is our tool.
We never ever whine
'Cause math is really cool.
Related rates galore
And differentials too,
How could you say that math's a bore
When it's taught by "you-know-who?"
(point to your teacher)
CHORUS:
Cal-cu-lus, Cal-cu-lus
You make our lives complete
Without learning cal-cu-lus
We'd end up on the street.
(Repeat)
To study for the test,
"Wild" parties are the key,
Then get a good night's rest,
And success you'll surely see.
But if you do not pass,
Corrections are your friend.
So hit the books and go to class-
The fun will never end!
CHORUS

12. **Riemann Sums**
[Denise McCleary and/or students at Fairview HS]
Tune: Jingle Bells
Riemann Sums, Riemann Sums
Counting Areas
Of rectangles whose widths get small
We need to count them all
Riemann Sums, Riemann Sums
Counting Areas
Of rectangles whose widths get small
We need to count them all.

We learn to integrate
It's really lots of fun.
It's easier to find
Than those old Riemann Sums
We learn to sub a *u*
When things get sort of hard
But most of all we tabulate
When we get sick of parts.
[repeat the refrain]

13. **Derivatives, Derivatives**
[Denise McCleary and/or students at Fairview HS]
Tune: "O Christmas Tree"
(think y=1*2)
Derivatives, derivatives
They help us find the rate of change.
Derivatives, derivatives
They're not that hard, they're in our range.

The product rule is so much fun
It's 1 prime 2 plus 2 prime 1
Derivatives, derivatives
They help us find the rate of change.

14. **Natural Logarithms and e^x**
"Santa Claus is Coming to Town"
You better beware
And don't make a fuss
Better take care
And learn calculus
AP time is rolling around

Now take ln e
It's equal to one
Don't you agree
We're having such fun
AP time is rolling around

And if you need assistance
For integral of tan
It's just ln of secant
For woman or for man

Oh the ln of one
Well what do you know
Obviously
It's just a zero
AP time is rolling around
No reason to go searching
Or go for a hopeless hunt
For ln of a power
Watch the power go in front

Graph e to the x
We're telling you why
Low on the left
Then rising so high
AP time is rolling around

15. **Fill the Boards**
[Dennis Gannon]
To: "Deck the Halls"
Fill the boards with differentials,
FA-LA-LA-LA-LA LA-LA-LA-LA
Note that *du*'s are essential,
FA-LA-LA-LA-LA LA-LA-LA-LA
C's are constants here before us,
FA-LA-LA-LA-LA LA-LA-LA-LA
Integration cannot floor us,
FA-LA-LA-LA-LA LA-LA-LA-LA

Quizzes never make us queasy,
FA-LA-LA-LA-LA LA-LA-LA-LA
Max and mins are always easy,
FA-LA-LA-LA-LA LA-LA-LA-LA,
Conic volumes we can measure,
FA-LA-LA-LA-LA LA-LA-LA-LA
3's to 5's we'll always treasure
FA-LA-LA-LA-LA LA-LA-LA-LA

16. **Oh, Calculus**
[Dennis Gannon (1940-1991) was an inspiring teacher at F. T. Maloney HS in Meriden, CT for 29 years]
Tune: "Oh, Christmas Tree"

Oh, Calculus; Oh, Calculus,
How tough are both your branches.
Oh, Calculus; Oh, Calculus.
To pass, what are my chances?
Derivatives I cannot take
At integrals my fingers shake.
Oh, Calculus; Oh, Calculus,
How tough are both your branches.

Oh, Calculus; Oh, Calculus,
Your theorems I can't master.
Oh, Calculus; Oh, Calculus,
My proofs are a disaster.
You pull a trick out of the air,
Or find a reason, who knows where
Oh, Calculus; Oh, Calculus,
Your theorems I can't master

Oh, Calculus; Oh, Calculus,
Your problems do distress me.
Oh, Calculus; Oh, Calculus,
Related rates depress me.
I walk toward lampposts in my sleep,
And running water makes me weep.
Oh, Calculus; Oh, Calculus,
Your problems do distress me.

Oh, Calculus; Oh, Calculus,
My limit I am reaching.
Oh, Calculus; Oh, Calculus.
For mercy I'm beseeching.
My grades do not approach a B,
They're just an epsilon from D.
Oh, Calculus; Oh, Calculus,
My limit I am reaching.

17. **The derivative song**
[A Tom Lehrer ditty. It appeared in the American Mathematical Monthly, 81 (1974) 490.]
Tune: "There'll Be Some Changes Made."
You take a function of *x* and you call it *y*,
Take any *x*-nought that you care to try,
You make a little change and call it delta *x*,
The corresponding change in *y* is what you find nex',
And then you take the quotient and now carefully
Send delta *x* to zero, and I think you'll see
That what the limit gives us, if our work all checks,
Is what we call *dy*/*dx*,
It's just *dy*/*dx*.