

Quiz 3 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1 and 2
2. Differentiate any function, including logarithmic, exponential, and inverse trigonometric functions.
3. Use implicit differentiation.
4. Apply the fundamental theorem to compute definite integrals and differentiate functions defined using definite integrals.
5. Graph and state the basic properties of trigonometric or hyperbolic functions, including inverse functions.
6. Integrate using substitution and integration by parts.

### Sample Quiz 3

1. Graph  $f(x) = \cosh x$  and state its properties.
2. Differentiate each of the following:
  - a)  $f(x) = \cot x + \sec x$
  - b)  $m(x) = e^{\cos 5x}$
  - c)  $M(a) = \tan^{-1}(a^4)$
3. Find  $y'$  using implicit differentiation in  $x^3 + y^3 = \sin(xy)$
4. Compute each of the following integrals.

$$\text{d) } f(x) = \int_0^{x^4} \sqrt{t^2 + 1} dt$$

$$\text{e) } g(x) = \sinh^{-1} x$$

$$\text{a) } \int \frac{x}{x^2 + 3} dx$$

$$\text{d) } \int e^x \cos x dx$$

$$\text{f) } \int_1^e x^3 \ln x dx$$

$$\text{b) } \int \frac{1}{x^2 + 3} dx$$

$$\text{g) } \int \sinh^{-1} x dx$$

$$\text{c) } \int \tan^{-1} x dx$$

$$\text{e) } \int \csc x dx$$

## Answers

1. see handout

2. a)  $f'(x) = -\cot^2 x - 1 + \sec x \tan x$     b)  $m'(x) = -5(\sin 5x)e^{\cos 5x}$     c)  $M'(a) = \frac{4a^3}{a^8 + 1}$

d)  $f'(x) = 4x^3\sqrt{x^8 + 1}$     e)  $g'(x) = \frac{1}{\sqrt{x^2 + 1}}$

3.  $y' = \frac{y \cos xy - 3x^2}{-x \cos xy + 3y^2} = \frac{-y \cos xy + 3x^2}{x \cos xy - 3y^2}$

4. a)  $\frac{1}{2} \ln(x^2 + 3) + C$     b)  $\frac{1}{\sqrt{3}} \arctan\left(\frac{x}{\sqrt{3}}\right) + C$     c)  $x \tan^{-1} x - \frac{1}{2} \ln(x^2 + 1) + C$

d)  $\frac{1}{2}e^x(\sin x + \cos x) + C$     e)  $-\ln|\csc x + \cot x| + C$     f)  $\frac{3}{16}e^4 + \frac{1}{16}$

g)  $x \sinh^{-1} x - \sqrt{x^2 + 1} + C$