

Quiz 2 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quiz 1
2. Differentiate any function, including logarithmic and exponential functions.
3. Use implicit differentiation.
4. Apply the fundamental theorem to compute definite integrals and differentiate functions defined using definite integrals.
5. Integrate using substitution.
6. State the properties, graph, and differentiate all 12 trigonometric functions. Integrate $\sin x$, $\cos x$, $\tan x$, $\cot x$, $\sec x$, $\csc x$.
7. State the properties and graph $\sinh x$, $\cosh x$, $\tanh x$. Differentiate all 12 hyperbolic functions. Integrate $\sinh x$, $\cosh x$, $\tanh x$, $\coth x$ and $\operatorname{sech} x$.

Sample Quiz 2

1. Consider $f(x) = \cosh x$. Graph f and state its properties.
2. Derive the formula for $\frac{d}{dx}(\sec^{-1} x)$.
3. Differentiate each of the following:

a) $f(x) = \log_3 \sqrt{x^4 + x^2 + 1}$

b) $m(x) = 2^{5x-1}$

c) $p(t) = \cos^{-1}(t^3)$

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

e) $f(y) = \left[\int_0^y \left(\frac{1}{\sqrt{x}} - 1 \right) dx \right]^3$

4. Compute each of the following integrals.

a) $\int_3^8 \frac{x}{\sqrt{x+1}} dx$

c) $\int \cot x dx$

e) $\int_0^{\ln 2} e^{-3x} dx$

b) $\int \frac{1}{\sqrt{1-9y^2}} dy$

d) $\int \sin x \sec^7 x dx$

f) $\int \frac{1}{2+x^2} dx$

Answers

1. see handout on hyperbolic functions

2. see handout on differentiating trigonometric functions

3. a) $f'(x) = \frac{1}{\ln 3} \frac{x + 2x^3}{x^2 + x^4 + 1}$ b) $m'(x) = \frac{5 \ln 2}{2} (2^{5x})$ c) $p'(t) = -\frac{3t^2}{\sqrt{1-t^6}}$

d) $f'(x) = \frac{\sqrt{(\ln x)^2 + 1}}{x}$ e) $f'(y) = 3y \left(\frac{1}{\sqrt{y}} - 1 \right) (2 - \sqrt{y})^2$

4. a) $\frac{32}{3}$ b) $\frac{1}{3} \sin^{-1}(3y) + C$ c) $\ln |\sin x| + C$ d) $\frac{1}{6} \sec^6 x + C$ e) $\frac{7}{24}$ f) $\frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{x}{\sqrt{2}} \right) + C$