# Quiz 5 Information

Quiz 5 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1-4
2. Differentiate any function, including logarithmic, exponential, and inverse trigonometric functions.
3. Apply the fundamental theorem to compute definite integrals and differentiate functions defined using definite integrals.
4. Graph trigonometric functions (all 12 of them) and state their basic propoerties, differentiate them and integrate them. (Exception: we did not yet integrate $\sec^{-1} x$ and $\csc^{-1} x$, so you don't need to know those.)
5. Integrate using substitution, trigonometric substitution, integration by parts, and partial fractions. Integrate trigonometric and inverse trigonometric functions. Improper Integrals.
6. Determine limits using L'Hôpital's Rule.
7. Riemann Sums (left, right, midpoint, trapezoid) and Simpson's Rule
8. Application of Integrals 1

## Sample Quiz 5

1. Compute $\dfrac{dy}{dx}$ if $y = \displaystyle\int_1^{\sec x} \frac{1}{\sqrt[4]{1+e^{2t}}}dt$
2. Compute each of the following integrals.

   a) $\displaystyle\int \frac{8x^2-11x+7}{(x^2+1)(x-1)}dx$

   b) $\displaystyle\int_0^{\pi/2} \tan x dx$

   c) $\displaystyle\int_0^{\infty} xe^{-3x}dx$

   d) $\displaystyle\int_1^3 \frac{1}{\sqrt{3-x}}dx$

   e) $\displaystyle\int \frac{\arctan x}{1+x^2}dx$

   f) $\displaystyle\int \frac{1}{\sqrt{9x^2-25}}dx$

   g) $\displaystyle\int_0^2 \frac{1}{\sqrt{4-x^2}}dx$

3. Consider the function $f(x) = e^{-x^2}$ on the interval $[0,2]$. Compute each of the following Riemann sums. Present approximate values, accurate up to three or more decimal places. In each case, use a uniform partition with $n = 8$.
   a) left-sum
   b) right-sum
   c) midpoint-sum
   d) trapezoid-sum
   e) Simpson's Rule
4. Find the average value of the function $f(x) = \dfrac{1}{x^2}$ on $[1,10]$.
5. Find the area that is formed between the graphs of $f(x) = x^2 - 6x + 8$ and $g(x) = 2x - 7$

## Answers

1. $\dfrac{\sec x \tan x}{\sqrt[4]{1+e^{2\sec x}}}$

2. a) $-5\tan^{-1} x + 2\ln|x-1| + 3\ln\left(x^2+1\right) + C$ b) $\infty$ c) $\dfrac{1}{9}$ d) $2\sqrt{2}$

   e) $\dfrac{1}{2}\arctan^2 x + C$ f) $\dfrac{1}{3}\ln\left(3x+\sqrt{9x^2-25}\right) + C$ g) $\dfrac{\pi}{2}$

3. a) 1.004 414 336 471 04 b) 0.758 993 246 193 225 c) 0.882 268 699 199 421
   d) 0.881 703 791 332 133 e) 0.882 065 510 401 332

4. $\dfrac{1}{10}$

5. $\dfrac{4}{3}$