Speed Review

Monday, February 9

Basic Identities

1. $\sin^2 x + \cos^2 x$
2. $\tan^2 x + 1$
3. $\tan x \cos x$
4. $\sec^2 x - 1$
5. $\sqrt{1 - \sin^2 x}$
6. $\sqrt{1 + \tan^2 x}$
7. $(1 + \sin x)(1 - \sin x)$
8. $\int \sec^2 x \, dx$
9. $\int \sec x \tan x \, dx$
10. $\int 1/\cos^2 x \, dx$
11. $\int \tan x \cos x \, dx$
12. $\sin 2x$
13. $\cos 2x$
14. $1 - \cos 2x$
15. $1 + \cos 2x$

Strategies for Integration

If integration by parts is necessary, circle your choice for u. If the first step is instead to make a substitution, write your choice of substitution.

1. $\displaystyle\int x^3\sqrt{1-x^2}\,dx$
2. $\displaystyle\int xe^{x^2}\,dx$
3. $\displaystyle\int \arcsin(x)\,dx$
4. $\displaystyle\int \frac{1}{x^2\sqrt{x^2-1}}\,dx$
5. $\displaystyle\int \frac{1}{x\ln x}\,dx$
6. $\displaystyle\int \frac{x^5}{x^2+1}\,dx$
7. $\displaystyle\int x\ln(x)\,dx$
8. $\displaystyle\int e^{\sqrt{x}}\,dx$
9. $\displaystyle\int x\sin(x)\,dx$
10. $\displaystyle\int x\sqrt{1+x^2}\,dx$
11. $\displaystyle\int \frac{x^2}{\sqrt{9-x^2}}\,dx$
12. $\displaystyle\int xe^x\,dx$
13. $\displaystyle\int \cos(x)\ln(\sin x)\,dx$
14. $\displaystyle\int \frac{x}{\sqrt{4+x^2}}\,dx$
15. $\displaystyle\int \frac{\sqrt{x^2-9}}{x^3}\,dx$
16. $\displaystyle\int x^3\cos(x^2)\,dx$
17. $\displaystyle\int x\arctan(x)\,dx$
18. $\displaystyle\int (x^2+2x)e^x\,dx$

Partial Fractions

Write out the partial fraction form of each of the following functions. Specify whether long division is necessary at the start.

1. $\left(\dfrac{x}{x+1}\right)^2$
2. $\dfrac{x^3}{(x+1)(x+4)}$
3. $\dfrac{1}{x(x^2+1)}$
4. $\dfrac{x+3}{(x+1)^2(x^2+1)^2}$
5. $\dfrac{x^4+5}{(x-1)^2(x+2)^3}$

Numerical Methods

1. If we want to estimate $\int_0^5 17x + 8\,dx$ using the Trapezoidal Rule, how many intervals do we need to guarantee that our error is less than 0.01?

2. If we want to estimate $\int_0^4 4x^2 - 3x + 2\,dx$ using Simpson's Rule, how many intervals do we need to guarantee that our error is less than 0.01?

Convergent or Divergent?

1. $\displaystyle\int_0^1 \frac{1}{x}\,dx$
2. $\displaystyle\int_0^1 \frac{1}{x^2}\,dx$
3. $\displaystyle\int_0^1 \frac{1}{\sqrt{x}}\,dx$
4. $\displaystyle\int_1^\infty \frac{1}{x}\,dx$
5. $\displaystyle\int_1^\infty \frac{1}{x^2}\,dx$
6. $\displaystyle\int_1^\infty \frac{1}{\sqrt{x}}\,dx$
7. $\displaystyle\int_0^1 \frac{1}{(x-1)^2}\,dx$
8. $\displaystyle\int_0^1 \frac{\sin x}{x}\,dx$
9. $\displaystyle\int_0^2 \frac{x+2}{(x-1)^{2/3}}\,dx$
10. $\displaystyle\int_2^\infty \frac{1}{\ln x}\,dx$
11. $\displaystyle\int_0^1 \ln(x)\,dx$
12. $\displaystyle\int_0^1 \frac{x}{\tan x}\,dx$