Name: Richard

MATH 200 – QUIZ 11 \$

I'm in the Thurs11 Thurs12 Thurs1 or Fri10 recitation. (Circle one)

November 16, 2012

1. $\lim_{x\to 0} \frac{\sin(x^2)}{x} = \lim_{x\to 0} \frac{\cos(x^2)2x}{1} = \frac{\cos(0^2)\cdot 2\cdot 0}{1} = \frac{1\cdot 2\cdot 0}{1} = \boxed{0}$

   form $\frac{0}{0}$

2. $\lim_{x\to\infty} (\ln x)^{1/x} = \lim_{x\to\infty} e^{\ln((\ln x)^{\frac{1}{x}})} = \lim_{x\to\infty} e^{\frac{1}{x}\ln(\ln x)} = \lim_{x\to\infty} e^{\frac{\ln(\ln x)}{x}}$

   form ∞^0 form $\frac{\infty}{\infty}$

   $= \lim_{x\to\infty} e^{\frac{\frac{1/x}{\ln x}}{1}} = \lim_{x\to\infty} e^{\frac{1}{x\ln x}} = e^0 = \boxed{1}$

3. $\int (x^3 + 2x + e^x)\,dx = \frac{x^4}{4} + 2\frac{x^2}{2} + e^x + C = \boxed{\frac{x^4}{4} + x^2 + e^x + C}$

4. $\int \sec^2(\pi x)\,dx = \boxed{\frac{1}{\pi}\tan(\pi x) + C}$

   Check: $\frac{d}{dx}\left[\frac{1}{\pi}\tan(\pi x)\right] = \frac{1}{\pi}\sec^2(\pi x)\pi = \sec^2(\pi x)$ ✓

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1. $\lim_{x\to 0} \frac{8x^2}{\cos(x)-1} = \lim_{x\to 0} \frac{16x}{-\sin(x)} = \lim_{x\to 0} \frac{16}{-\cos(x)} = \frac{16}{-\cos(0)} = \frac{16}{-1} = \boxed{-16}$

   form $\frac{0}{0}$ still form $\frac{0}{0}$

2. $\lim_{x\to 0^+} x^x = \lim_{x\to 0^+} e^{\ln x^x} = \lim_{x\to 0^+} e^{x\ln(x)} = \lim_{x\to 0^+} e^{\frac{\ln x}{\frac{1}{x}}} = \lim_{x\to 0^+} e^{\frac{1/x}{-1/x^2}}$

   form $\frac{0}{0}$

   $= \lim_{x\to 0^+} e^{-x} = e^{-0} = \boxed{1}$

3. $\int (5x^2 + 2 + \sin x)\,dx = \boxed{\frac{5}{3}x^3 + 2x - \cos x + C}$

4. $\int e^{5x}\,dx = \boxed{\frac{1}{5}e^{5x} + C}$

   Check $\frac{d}{dx}\left[\frac{1}{5}e^{5x} + C\right] = \frac{1}{5}e^{5x}\cdot 5 = e^{5x}$ ✓

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November 15, 2012

1. $\lim_{x\to 0} \frac{x^2}{\ln(\sec x)} = \lim_{x\to 0} \frac{2x}{\frac{\sec x \tan x}{\sec x}} = \lim_{x\to 0} \frac{2x}{\tan x} = \lim_{x\to 0} \frac{2}{\sec^2 x} = \frac{2}{\sec^2 0} = \frac{2}{1^2} = \boxed{2}$

form $\frac{0}{0}$

still $\frac{0}{0}$

2. $\lim_{x\to\infty} (\ln 2x - \ln(x+1)) = \lim_{x\to\infty} \ln\left(\frac{2x}{x+1}\right) = \ln\left(\lim_{x\to\infty} \frac{2x}{x+1}\right) = \boxed{\ln 2}$

3. $\int (3 + x^2 + 3e^x)\,dx = \boxed{3x + \frac{x^3}{3} + 3e^x + C}$

4. $\int \sec(\pi x)\tan(\pi x)\,dx = \boxed{\frac{1}{\pi}\sec(\pi x) + C}$

Check $\frac{d}{dx}\left[\frac{1}{\pi}\sec(\pi x) + C\right]$
$= \frac{1}{\pi}\sec(\pi x)\tan(\pi x)\cdot\pi + 0$
$= \sec(\pi x)\tan(\pi x)$ ✓

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1. $\lim_{x\to\frac{\pi}{2}} \frac{2x-\pi}{\cos(2\pi - x)} = \lim_{x\to\pi/2} \frac{2}{-\sin(2\pi - x)(-1)} = \frac{2}{\sin(2\pi - \frac{\pi}{2})} = \frac{2}{\sin(\frac{3\pi}{2})} = \frac{2}{-1} = \boxed{-2}$

form $\frac{0}{0}$

2. $\lim_{x\to 0^+} x^2 \ln x = \lim_{x\to 0^+} \frac{\ln x}{1/x^2} = \lim_{x\to 0^+} \frac{\frac{1}{x}}{\frac{-2}{x^3}} = \lim_{x\to 0^+} -\frac{x^2}{2} = \frac{-0^2}{2} = \boxed{0}$

form $0\cdot\infty$ form $\frac{\infty}{\infty}$

3. $\int (7 + x^6 + \sec^2(x))\,dx = \boxed{7x + \frac{x^7}{7} + \tan(x) + C}$

4. $\int e^{-x}\,dx = \boxed{-e^{-x} + C}$

Check: $\frac{d}{dx}\left[-e^{-x} + C\right] = -e^{-x}(-1) + 0$
$= e^{-x}$ ✓