Name: Richard

MATH 200 – QUIZ 6 ♣

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

October 3, 2012

1. Find the derivative of $f(r) = 5r - \cos(r) + \frac{1}{r}$. $= 5r - \cos(r) + r^{-1}$

$$f'(x) = 5 + \sin(r) - r^{-2} = \boxed{5 + \sin(r) - \frac{1}{r^2}}$$

2. Find $\frac{dy}{dx}$ if $y = \sqrt{\frac{x^2+1}{e^x}}$. $= \left(\frac{x^2+1}{e^x}\right)^{\frac{1}{2}}$ $\quad \frac{dy}{dx} = \frac{1}{2}\left(\frac{x^2+1}{e^x}\right)^{\frac{1}{2}-1} \frac{d}{dx}\left[\frac{x^2+1}{e^x}\right] =$

$$= \frac{1}{2}\left(\frac{x^2+1}{e^x}\right)^{-\frac{1}{2}} \frac{2x\,e^x - (x^2+1)e^x}{(e^x)^2} = \frac{1}{2}\left(\frac{e^x}{x^2+1}\right)^{\frac{1}{2}} \frac{e^x(2x - x^2 - 1)}{(e^x)^2}$$

$$= \boxed{\frac{1}{2}\sqrt{\frac{e^x}{x^2+1}}\ \frac{2x - x^2 - 1}{e^x}}$$

3. $\frac{d}{dx}\left[\, x^4 \tan(\pi x)\,\right] = 4x^3\tan(\pi x) + x^4 \frac{d}{dx}\left[\tan(\pi x)\right] = \boxed{4x^3\tan(\pi x) + x^4 \sec^2(\pi x)\,\pi}$

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1. Find the derivative of $f(r) = 3e^r - \frac{1}{r^2} + \sin(r)$. $= 3e^r + \sin(r) - r^{-2}$

$$f'(x) = 3e^r + \cos(r) + 2r^{-3} = \boxed{3e^r + \cos(r) + \frac{2}{r^3}}$$

2. $\frac{d}{dx}\left[\, e^{x^2\sec(x)}\,\right] = e^{x^2\sec(x)} \frac{d}{dx}\left[x^2\sec(x)\right] = \boxed{e^{x^2\sec(x)}\left(2x\sec(x) + x^2\sec(x)\tan(x)\right)}$

3. Find $\frac{dy}{dx}$ if $y = \frac{x^2+1}{e^{\pi x}}$. $\quad \frac{dy}{dx} = \frac{\frac{d}{dx}[x^2+1]e^{\pi x} - (x^2+1)\frac{d}{dx}\left[e^{\pi x}\right]}{\left(e^{\pi x}\right)^2}$

$$= \frac{2x\,e^{\pi x} - (x^2+1)e^{\pi x}\pi}{(e^{\pi x})^2} = \frac{e^{\pi x}(2x - \pi(x^2+1))}{(e^{\pi x})^2} = \boxed{\frac{2x - \pi(x^2+1)}{e^{\pi x}}}$$

ok to leave it unsimplified

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1. Find the derivative of $f(\theta) = 5\theta - \cot(\theta) + \sqrt{\theta}$. $= 5\theta - \cot(\theta) + \theta^{1/2}$

$$f'(\theta) = 5 + \csc^2(\theta) + \frac{1}{2}\theta^{-1/2} = \boxed{5 + \csc^2(\theta) + \frac{1}{2\sqrt{\theta}}}$$

2. $\frac{d}{dx}\left[\left(\frac{x^2}{e^x+1}\right)^{100}\right] = 100\left(\frac{x^2}{e^x+1}\right)^{99}\frac{d}{dx}\left[\frac{x^2}{e^x+1}\right] = \boxed{100\left(\frac{x^2}{e^x+1}\right)^{99}\frac{2x(e^x+1)-x^2e^x}{(e^x+1)^2}}$

3. Find $\frac{dy}{dx}$ if $y = x^3\sec(\pi x)$.

$$\frac{dy}{dx} = \frac{d}{dx}[x^3]\sec(\pi x) + x^3\frac{d}{dx}[\sec(\pi x)]$$

$$= \boxed{3x^2\sec(\pi x) + x^3\sec(\pi x)\tan(\pi x)\,\pi}$$

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1. Find the derivative of $f(s) = \tan(s) - \frac{3}{s^2} + 2e^s$. $= \tan(s) - 3s^{-2} + 2e^s$

$$f'(s) = \sec^2(s) + 6s^{-3} + 2e^s = \boxed{\sec^2(s) + \frac{6}{s^3} + 2e^s}$$

2. Find $\frac{dy}{dx}$ if $y = \sec(x^2e^x)$.

$$\frac{dy}{dx} = \sec(x^2e^x)\tan(x^2e^x)\frac{d}{dx}[x^2e^x]$$

$$= \sec(x^2e^x)\tan(x^2e^x)(2xe^x + x^2e^x)$$

$$= \boxed{\sec(x^2e^x)\tan(x^2e^x)\,xe^x(2+x)}$$

3. $\frac{d}{dx}\left[\frac{e^{\pi x}}{x^2+1}\right] = \frac{\frac{d}{dx}[e^{\pi x}](x^2+1) - e^{\pi x}\frac{d}{dx}[x^2+1]}{(x^2+1)^2}$

$$= \boxed{\frac{e^{\pi x}\pi(x^2+1) - e^{\pi x}2x}{(x^2+1)^2}}$$