Homework for Packet #6

1.

a) $f'(x) = 7(5x^3 - x^4)^6(15x^2 - 4x^3)$

b) $\frac{dy}{dx} = 6\sin^5 x \cos x$

c) $f'(x) = \frac{6}{(1-2x)^4}$

d) $f'(x) = -\frac{15}{2(3x+4)^{3/2}}$

e) $f'(x) = \frac{3e^{\sqrt{3x+1}}}{2\sqrt{3x+1}}$

f) $f'(x) = 2x\sinh(x^2 - 4)\, e^{\cosh(x^2-4)}$

g) $\frac{dy}{dx} = 3x^2e^{3x} + 2xe^{3x}$

h) $\frac{dy}{dx} = (x^2 + x)e^{\sin x}\cos x + (2x+1)e^{\sin x}$

i) $f'(x) = \frac{-2x\sin x + \cos x}{2\sqrt{x}\sqrt{1 - x\cos^2 x}}$ (or $\frac{-2x\sin x+\cos x}{2\sqrt{x - x^2\cos^2 x}}$)

j) $f'(x) = \frac{-\csc\left(\frac{\log_2 x}{x}\right)\cot\left(\frac{\log_2 x}{x}\right)(1 - (\log_2 x)(\ln 2))}{x^2 \ln 2}$

k) $\frac{dy}{dx} = \frac{5e^{\cosh^{-1} 5x}}{\sqrt{25x^2 - 1}}$

l) $\frac{dy}{dx} = 2xe^{\cos^2 3x} - 6x^2e^{\cos^2 3x}\sin 3x\cos 3x$

m) $f'(x) = -\cos(\cos(\tan x))\sin(\tan x)\sec^2 x$

n) $f'(x) = \frac{-e^x\cot(e^x)}{\ln 2}$

o) $\frac{dy}{dx} = \frac{3x^2\sec(x^3)\tan(x^3)}{2\sqrt{\sec(x^3)}}$

p) $f'(x) = \frac{\tan x}{2\sqrt{\ln(\sec x)}}$

q) $f'(x) = -\frac{2}{3(\cos^{-1}(2x+1))^{\frac{2}{3}}\sqrt{1-(2x+1)^2}}$

r) $f'(x) = \frac{\operatorname{sech}^2 x}{2\sqrt{1 - \tanh x}\sqrt{\tanh x}}$

s) $f'(x) = \frac{\sqrt{x}\log_3 x \sinh\sqrt{x}\ln 3 - 2\cosh\sqrt{x}}{2x\ln 3(\log_3 x)^2}$

t) $f'(x) = \frac{\sqrt{x}\ln x\cosh\sqrt{x} - 2\sinh\sqrt{x}}{2x(\ln x)^2}$

u) $\frac{dy}{dx} = \frac{3\sec^2 3x}{\sqrt{1 + \tan^2 3x}}$

v) $\frac{dy}{dx} = \frac{3^{\sin\sqrt{x}}\cos\sqrt{x}\ln 3}{2\sqrt{x}}$

2. $y = 1$

3. $y + 1 = \frac{4}{3}(x - 2)$ (or $y = \frac{4}{3}x - \frac{11}{3}$)

4. $y - 2\sqrt{2} = -\frac{1}{2\sqrt{2}}(x - 1)$ (or $y = -\frac{1}{2\sqrt{2}}x + \frac{1}{2\sqrt{2}} + 2\sqrt{2}$)

5. $y - \ln 2 = x$ (or $y = x + \ln 2$)

6. $y'' = -4\cos(2x)$

7. $y'' = \frac{1}{(x^2+1)^{3/2}}$

8. $(0,1)$

9. $(2\pi k, 3)$ and $(\pi + 2\pi k, -1)$

10. $f'(x) = 2(2x+1)^2(4x-3)^3(28x-1)$

11. $f'(x) = 3(x+5)^5(3x-2)^4(11x+21)$

Review

12.

a) 0

b) $-\infty$

Challenge Problem: $y^{(1000)} = 2^{1000}\cos(2x)$