

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

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

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

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

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

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

5.  $y - \ln 2 = x \quad (\text{or } y = x + \ln 2)$

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

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

$$8. (0,1)$$

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

**Review**

10.

a) 0

b)  $-\infty$

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