Answers:1. $\lim_{h\to 0}\dfrac{4(x+h)^2-3(x+h)+5-(4x^2-3x+5)}{h}=8x-3$ 2. Yes. No. Curve not smooth.

3a. $f'(x)=\dfrac{3e^{\frac{1}{x}}\left(5-e^{\frac{1}{x}}\right)^{\frac{1}{2}}}{2x^2}$ b. $f'(x)=\dfrac{20x(x-1)(5x^2+3)-(5x^2+3)^2}{(x-1)^2}$

c. $f'(x)=\dfrac{x(x+5)^2}{(x^2+1)^{\frac{1}{2}}}+2(x+5)(x^2+1)^{\frac{1}{2}}$ d. $f'(x)=-1$ e. $f'(x)=0$ f.

$f'(x)=(\ln\pi)\pi^2x^2+2x\pi^x$ g. $f'(x)=\dfrac{4}{3}x\sec^2\dfrac{x^2}{3}\tan\dfrac{x^2}{3}$ h.

$f'(x)=(x+1)^{e^{2x}}\left(\dfrac{e^{2x}}{x+1}+2e^{2x}\ln(x+1)\right)$ i. $f'(x)=\dfrac{x}{x^2+1}-\dfrac{1}{x}-\dfrac{12x^2}{2x^3-1}$

j. $f'(x)=-3(\ln 10)10^{\csc 3x}\csc 3x\cot 3x$ k. $f'(x)=\dfrac{2x-2}{(\ln 5)(x^2-2x+1)}$

4. $y=2$ 5a. $f'(x)=x^2-4x-5$ b. $\left(-1,\dfrac{5}{3}\right)$ and $\left(5,-\dfrac{31}{3}\right)$ 6. $y'=-\dfrac{y}{x+xye^{-y}}$

7a. –51 b. –32 8. done in class, see notes 9. done in class, see notes10. False. Need product rule.

11. $\dfrac{dr}{dt}=-\dfrac{1}{4\pi}$