WA 3

20/20

1) 6/6

#2: $g(z) = (5z-3)(z+2)$

$g'(z) = 5 \cdot (z+2) + (5z-3)(1) = 5(z+2) + 5z - 3$ +1

$= 10z + 7$

#4 $s(t) = (t^2+2)(3t^2-1)$

$s'(t) = (2t)(3t^2-1) + (t^2+2)(6t)$ +1

#6 $F(w) = (w-1)(2w-1)(3w-1)$

$F'(w) = (1)\left[(2w-1)(3w-1)\right] + (w-1) \cdot \left[\frac{d}{dw}\left((2w-1)(3w-1)\right)\right]$

$= (2w-1)(3w-1) + (w-1)\left(2 \cdot (3w-1) + (2w-1)(3)\right)$

$F'(w) = (2w-1)(3w-1) + 2(w-1)(3w-1) + 3(w-1)(2w-1)$ +2

#8 $f(x) = \dfrac{x^2}{1+2x^3}$

$f'(x) = \boxed{\dfrac{2x(1+2x^3) - x^2(6x^2)}{(1+2x^3)^2}}$ +1

#10 $h(z) = \dfrac{1+2z^3}{1+z^2}$

$h'(z) = \boxed{\dfrac{(6z^2)(1+z^2) - (1+2z^3)(2z)}{(1+z^2)^2}}$ +1

2]

$$p(z) = (1+3z)^2(1+2z)^3$$

2/2

$$p'(z) = \left[(1+3z)^2\right]' \cdot (1+2z)^3 + (1+3z)^2\left[(1+2z)^3\right]'$$

$$= \left[2(1+3z)\cdot 3\right]\cdot(1+2z)^3$$

$$+ (1+3z)^2\left[3(1+2z)^2 \cdot 2\right]$$

$$p'(z) = \underline{6(1+3z)(1+2z)^3 + 6(1+3z)^2(1+2z)^2}$$

+2

3]

$$G(x) = \frac{1}{1+x^3}$$

2/2

$$G'(x) = \frac{-1}{(1+x^3)^2} \cdot (3x^2)$$

$$G'(1) = \frac{-1}{(1+1^3)^2} \cdot (3) = \boxed{-\frac{3}{4}}$$

+1

Tangent Line: $y = mx + b$, $m = -\frac{3}{4}$

use point $(1, \frac{1}{2})$:

$$\frac{1}{2} = 1 \cdot \left(-\frac{3}{4}\right) + b$$

$$b = \frac{1}{2} + \frac{3}{4} = \frac{5}{4}$$

$$\boxed{y = \underline{-\frac{3}{4}x + \frac{5}{4}}}$$

+1

4) 15) $p(x) = f(x)\, g(x)$

3/3

$f(x) = x \quad g(x) = x^2$

Incorrect: $p'(x) = f'(x)\, g'(x) = 1 \cdot 2x = 2x$ +1

Correct: $p(x) = x \cdot x^2 = x^3$,

$p'(x) = 3x^2$. +1

16) $f(x) = 1$, $g(x) = x^3$

Incorrect $p'(x) = (1)' \cdot (x^3)' = 0 \cdot (3x^2) \boxed{= 0}$. +1

Correct: $p'(x) = 3x^2$.

5) (a) $M(t) = 1 + t^2$

$V(t) = 1 + 2t$

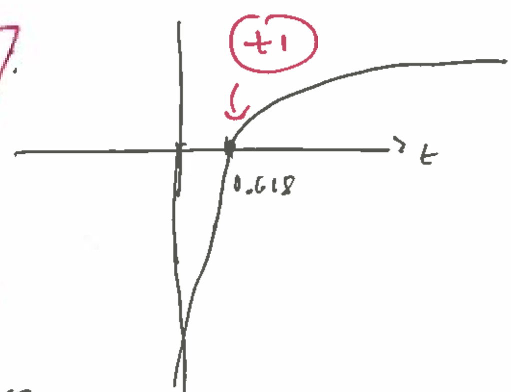
4/4

$$\boxed{\rho(t) = \frac{1+t^2}{1+2t}} \quad \left(\frac{M}{V}\right)$$ +1

(b) $$\rho'(t) = \frac{(2t)(1+2t) - (1+t^2)(2)}{(1+2t)^2} = \frac{2t + 4t^2 - 2 - 2t^2}{(1+2t)^2}$$

$$= \boxed{\frac{2t^2 + 2t - 2}{(1+2t)^2}}$$ +1

$\boxed{\text{graph } \rho'}$.



(c) Note: $\rho'(t) > 0$ for $t > 0.618$

So $\boxed{\rho \text{ is increasing for } t > 0.618.}$ +1

Get the number by solving $2t^2 + 2t - 2 = 0$.

6] $F(x) = x e^{-(x^2)}$

3/3

$$F'(x) = 1 \cdot e^{-x^2} + x \cdot \frac{d}{dx}\left(e^{-x^2}\right)$$

$$= e^{-x^2} + x \cdot \left(-2x \cdot e^{-x^2}\right)$$

$$= e^{-x^2} \cdot \left(1 - 2x^2\right)$$

+1 for work

$F'(x) = 0$ when $1 - 2x^2 = 0$ (b/c $e^{-x^2} \neq 0$ ~~ever~~ never!)

$$2x^2 = 1$$

$$x^2 = \frac{1}{2}$$

$$\boxed{x = \pm\sqrt{\frac{1}{2}}}$$

+ ~~3~~ 2