WA 2

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1) 4/4

#9 $f(x) = 3x^2 + 3x + 1$

$f'(x) = 6x + 3$ +1

#10 $s(x) = 1 - x + x^2 - x^3 + x^4$

$s'(x) = -1 + 2x - 3x^2 + 4x^3$ +1

#11 $g(z) = 3z^3 + 2z^2$

$g'(z) = 9z^2 + 4z$ +1

#12 $p(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24}$

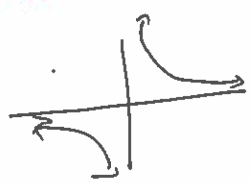
$p'(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{6}$ +1

2) 4/4

(a) $\lim_{t \to 0^+} \frac{15}{2t} = +\infty$ +1

(b) $\lim_{t \to 5} \frac{x+5}{(x-5)^2} = +\infty$ +1

(c) $\lim_{x \to 7} \frac{600}{x-7}$ DNE +1



The left and right handed limits do not agree.

+1 for explanation.

3) 4/4

(a) $h(t) = 0$ when $-16t^2 + 2t + 15 = 0$

quad. formula: $t = \frac{-2 \pm \sqrt{4 - 4(-16)(15)}}{-32}$

~~$t = -0.908$~~

$t = 1.033$ +1

(b) $v(t) = h'(t) = -32t + 2$ +1

(c) $v(t) = 0$ when $-32t + 2 = 0$

$2 = 32t$ +1

$\boxed{t = \frac{1}{16} \approx 0.0625 \text{ sec.}}$

The height is then

$h(0.0625) \approx 15.0625$ feet +1

(-0.5 if units are ignored)

4 (a) The slope of the tangent line is 0 at a critical point.

3/3 This means f is flat near that point. +1 for some explanation.

(b) $f(t) = t^2 + t + 1$

$f'(t) = 2t + 1$

$f'(t) = 0 \Rightarrow 2t + 1 = 0 \Rightarrow \boxed{t = -\frac{1}{2}}$ +1

(c) $f(t) = 3 - 7t$

$f'(t) = -7 \neq 0$, so this function has no critical points.

+1

5 $f(t) = \frac{1}{t}$

4/4 $f'(t) = \lim_{h \to 0} \dfrac{\frac{1}{t+h} - \frac{1}{t}}{h} = \lim_{h \to 0} \dfrac{(t - (t+h))}{t(t+h)} \cdot \dfrac{1}{h}$

$= \lim_{h \to 0} \dfrac{-h}{(t^2 + th) \cdot h}$

$= \lim_{h \to 0} \dfrac{-1}{t^2 + th} = \underbrace{-\dfrac{1}{t^2}}_{\text{+1 for answer}}$.

+2 for showing work

with power rule: $f(t) = t^{-1}$

$f'(t) = -1 \cdot t^{-2} = -\frac{1}{t^2}$, so they match!

+1 for checking with the power rule.

6| $G(s) = 14 + \frac{1}{\sqrt{2s}} = 14 + (2s)^{-1/2}$

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$= 14 + 2^{-1/2} \cdot s^{-1/2}$

$G'(s) = 0 + 2^{-1/2} \cdot \left(-\frac{1}{2}\right) \cdot s^{-3/2}$

$G'(4) = 2^{-1/2} \cdot \left(-\frac{1}{2}\right) \cdot \left(4^{-3/2}\right) = -0.0442$

Tangent Line:

$y = ms + b$, has the point $(4, 14.354)$

$m = -0.0442$

$14.354 = 4 \cdot (-0.0442) + b$

$b = 14.354 + 4(+0.0442) = 14.531$

+1 for work.

$y = -0.0442\, s + 14.531$

+2

* only take off 1 point if they say the derivative is

$G'(s) = -\frac{1}{2}(2s)^{-3/2}$.