Calculus - 3.4 #1, 4-10, 11-17 odd

1 (tangent to a line is the line)
a) 0 b) 1 c) -1 d) undefined e) m

4 horizontal, slope = 0 5 2 6 -1 7 $\frac{1}{4}$

8 $\frac{-5}{6}$ 9 0 10 undefined

11 $f'(x) = \lim_{h\to 0} \frac{-4(x+h)^2 + 9(x+h) + 2 - (-4x^2 + 9x + 2)}{h}$

$= \lim_{h\to 0} \frac{\cancel{-4x^2} - 8xh - 4h^2 \cancel{+9x} + 9h \cancel{+2} \cancel{+4x^2} \cancel{-9x} \cancel{-2}}{h}$

$= \lim_{h\to 0} \frac{-8xh - 4h^2 + 9h}{h} = \lim_{h\to 0} -8x - 4h + 9 = -8x + 9$

$\boxed{f'(x) = -8x + 9}$ $\boxed{f'(-2) = 25}$ $\boxed{f'(0) = 9}$ $\boxed{f'(3) = -15}$

13 $f'(x) = \lim_{h\to 0} \frac{\frac{12}{x+h} - \frac{12}{x}}{h} = \lim_{h\to 0} \frac{\frac{12x - 12(x+h)}{x(x+h)}}{h} = \lim_{h\to 0} \frac{\frac{-12h}{x(x+h)}}{h} =$

$\lim_{h\to 0} \frac{-12\cancel{h}}{x(x+h)} \cdot \frac{1}{\cancel{h}} = \lim_{h\to 0} \frac{-12}{x(x+h)} = \frac{-12}{x^2}$

$\boxed{f'(x) = \frac{-12}{x^2}}$ $\boxed{f'(-2) = -3}$ $\boxed{f'(0) = \text{undef}}$ $\boxed{f'(3) = \frac{-12}{9} = \frac{-4}{3}}$

(15) $F'(x) = \lim_{h \to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h} \cdot \frac{(\sqrt{x+h} + \sqrt{x})}{(\sqrt{x+h} + \sqrt{x})} = \lim_{h \to 0} \frac{x+h-x}{h(\sqrt{x+h} + \sqrt{x})}$

$= \lim_{h \to 0} \frac{h}{h(\sqrt{x+h} + \sqrt{x})} = \lim_{h \to 0} \frac{1}{\sqrt{x+h} + \sqrt{x}} = \frac{1}{2\sqrt{x}}$

$\boxed{F'(x) = \frac{1}{2\sqrt{x}}}$ $\boxed{F'(-2) = DNE}$ $\boxed{F'(0) = DNE}$ $\boxed{F'(3) = \frac{1}{2\sqrt{3}}}$

(17) $F'(x) = \lim_{h \to 0} \frac{2(x+h)^3 + 5 - (2x^3+5)}{h}$

$= \lim_{h \to 0} \frac{2(x^3 + 3x^2h + 3xh^2 + h^3) + \cancel{5} - 2x^3 - \cancel{5}}{h}$

$= \lim_{h \to 0} \frac{\cancel{2x^3} + 6x^2h + 6xh^2 + 2h^3 - \cancel{2x^3}}{h} = \lim_{h \to 0} 6x^2 + 6xh + 2h$

$\boxed{F'(x) = 6x^2}$ $\boxed{F'(-2) = 24}$ $\boxed{F'(0) = 0}$ $\boxed{F'(3) = 54}$

End of Day 1 questions