1. *FALSE* - $f(x)$ is not cont at $x=0$

2. **FALSE**

3. **TRUE**

4. **TRUE** - $f(x) = c \Rightarrow f'(x) = 0$

5. $f(x) = x^2$ \([-2, 1]\)

6. $f(x) = x^{2/3}$ \([0, 1]\)

7. $f(x) = \frac{x+1}{x}$ \([\frac{1}{2}, 2]\)

8. $f(x) = (x-2)^{3/2}$ \([2, 6]\)

9. $f(x) = x^3 - x^2 - 2x$ \([-1, 1]\)

10. $f(x) = 5\cos\pi x$ \([0, 1]\)

\[\frac{2}{3\sqrt[3]{x}} = 1\]

\[2 = 3\sqrt[3]{x}\]

\[\frac{1}{3\sqrt[3]{x}} = \frac{2}{3}\]

\[x = \frac{8}{27}\]

\[\frac{-1}{x^2} = -1\]

\[x = \pm 1 \Rightarrow x = 1\]
13. \( f(x) = x^{2/3} - 1 \quad [-8, 8] \)

\( f(x) \) is not defined at \( x=0 \), so RT cannot be applied.

\( f'(x) = \frac{2}{3}x^{-1/3} = \frac{2}{3\sqrt[3]{x}} \)

The derivative is undefined at \( x=0 \).

17. \( f(x) = \frac{x^2-2x-3}{x+2} \quad [-1, 5] \)

\( f(x) \) is continous and differentiable on \((-1, 3) \) and \( f(1) = 0 = f(3) \), so RT can be applied.

\( f'(x) = \frac{(x+2)(2x-3) - (x^2-2x-3)(1)}{(x+2)^2} \)

\( f'(x) = \frac{2x^2 - 2x + 4x - 3x - 6}{(x+2)^2} = \frac{x^2 + x - 3}{(x+2)^2} \)

14. \( f(x) = \frac{x^2-1}{x} \quad [-1, 1] \)

\( f(x) \) is not continous at \( x=0 \), so RT cannot be applied.

\( f'(x) = \frac{(x^2-1)'x - x(x^2-1)'}{x^2} = \frac{-2x^2}{x^2} = -2 \)

15. \( f(x) = \cos x \quad [0, 2\pi] \)

\( f(x) \) is continous and differentiable on \([0, 2\pi] \) and \( f(0) = 1 = f(2\pi) \), so RT can be applied.

\( f'(x) = -\sin x = 0 \)

\( \sin x = 0 \)

\( x = 0, \pi, 2\pi \)

18. \( f(x) = \tan x \quad [0, \pi] \)

\( f(x) \) is not continous at \( x = \frac{\pi}{2} \), so RT does not apply.

\( x = -\frac{4 \pm \sqrt{16-4(1)(-1)}}{2(1)} = -\frac{4 \pm \sqrt{20}}{2} = -\frac{4 \pm 2\sqrt{5}}{2} = -2 \pm \sqrt{5} \)

11. \( f(x) = x^2 - 2x \quad [0, 2] \)

\( f(x) \) is continous and differentiable on \([0, 2] \) and \( f(0) = 0 = f(2) \), so RT applies.

\( f'(x) = 2x - 2 = 0 \)

\( 2x = 2 \)

\( x = 1 \)

12. \( f(x) = (x-3)(x^2 + 2x + 1) \quad [1, 3] \)

\( x^3 + 2x^2 + x - 3x^2 - 6x - 3 \)

\( x^3 - x^2 - 5x - 3 \)

\( f(x) \) is continous and differentiable on \([1, 3] \), but \( f(1) = 0 \) and \( f(3) = 8 \) and

\( f(x) = 0 \), so RT cannot be applied.
19. no - f(x) is not differentiable at x = 0

20. no - no tangent line II to Secant line

21. yes - cont. & diff on (1, 2)

22. yes - all values from (1, 2) satisfy the conclusions of MVT

23. H - no, not diff
   C - no, no tangent line

24. H - yes
   C - yes (2 places)

25. H - no, not cont
   C - no

26. H - no
   C - yes