Answers to Worksheet on the Mean Value Theorem

1. $x = 3$

2. $-\dfrac{4}{5}$

3. B

4. $x = 0$ and $x = 2$

5. g is differentiable, so g is continuous on $[-5, -3]$, and $\dfrac{g(-3) - g(-5)}{-3 - (-5)} = \dfrac{2 - 10}{2} = -4$. Therefore, by the Mean Value Theorem, there is at least one c, $-5 < c < -3$, such that $g'(c) = -4$.

6. Because H is differentiable on $3 \le t \le 5$, H is continuous on $3 \le t \le 5$, and $\dfrac{H(5) - H(3)}{5 - 3} = \dfrac{6 - 2}{2} = 2$. Therefore, by the Mean Value Theorem, there exists a value c, $3 < c < 5$, such that $H'(c) = 2$.

7. $f'(x) = x^2 - 2x - 3$

8. Sketch

9. -1 and 3

10. -1 and 3

11. $(-\infty, -1) \cup (3, \infty)$

12. $(-\infty, -1) \cup (3, \infty)$

13. $-1 < x < 3$

14. $-1 < x < 3$

15. $f'(x) = \dfrac{2}{3(x-1)^{\frac{1}{3}}}$

16. Sketch

17. 1

18. 1

19. $(1, \infty)$

20. $(1, \infty)$

21. $(-\infty, 1)$

22. $(-\infty, 1)$

23. $f'(x) = 0$ or $f'(x)$ is undefined

24. $f'(x) > 0$

25. $f'(x) < 0$