
HOMEWORK DAY 4 – *Continuity §1.8*

1. §1.8: 1.

2. §1.8: 3.

3. §1.8: 5.

4. §1.8: 6.

5. §1.8: 17

6. §1.8: 20

7. §1.8: 22

8. §1.8: 23

9. §1.8: 42. Also sketch a graph of f .

10. §1.8: 44

11. §1.8: 46 (gravitational force) Also sketch a graph of $F(r)$.

12. §1.8: 47 Also sketch a graph of $f(x)$ for the value of c that you found.

HOMEWORK DAY 5 – *Definition of the derivative §2.1*

13. §2.1: 1

14. §2.1: 3

15. §2.1: 10

16. §2.1: 15

17. §2.1: 16

18. §2.1: 17

19. A cylindrical tank initially holds 100,000 gallons and is being drained from the bottom over the interval of 1 hour. The amount of gallons of water V remaining in the tank after t minutes is given by

$$V(t) = 100,000\left(1 - \frac{t}{60}\right)^2, \quad t \in [0, 60].$$

(a) What is the meaning of the derivative $V'(t)$? What are its units?

(b) In practical terms, what does it mean to say that $V'(10) \approx -2777.8$?

(c) Sketch a graph of $V(t)$. What is a geometrical meaning of the derivative $V'(t)$?

(d) For $t > 0$, is $V'(t) \geq 0$ or ≤ 0 ? Use only your graph above

(e) At what time is $|V'(t)|$ largest? Explain physically why that makes sense.

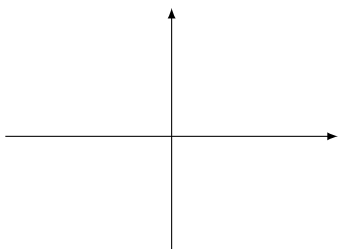
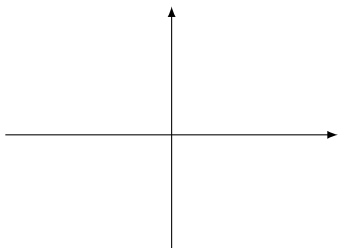
20. Let $f(x) = x^3$. Find $f'(a)$

21. §2.1: 25

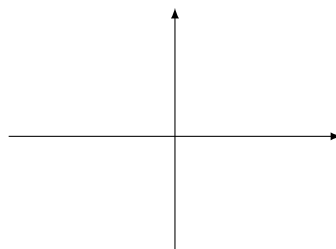
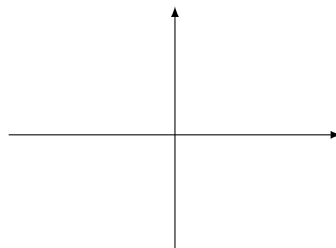
HOMEWORK DAY 6 – *The derivative as a function §2.2*

22. §2.2: 3

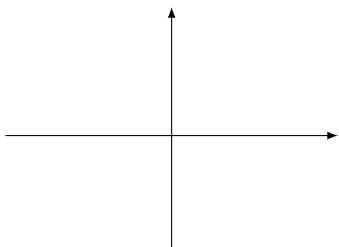
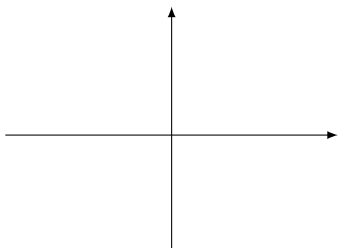
23. §2.2: 4



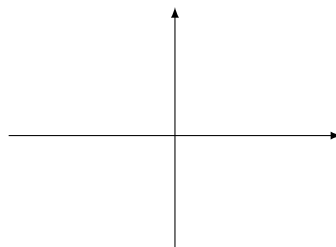
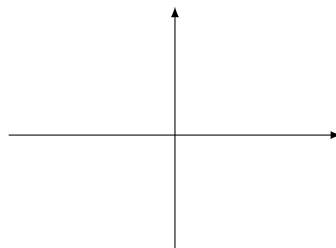
§2.2: 5



24. §2.2: 7



§2.2: 9



25. §2.2: 46. First answer: which is f , which is f' ? Then answer question.

26. §2.2: 14

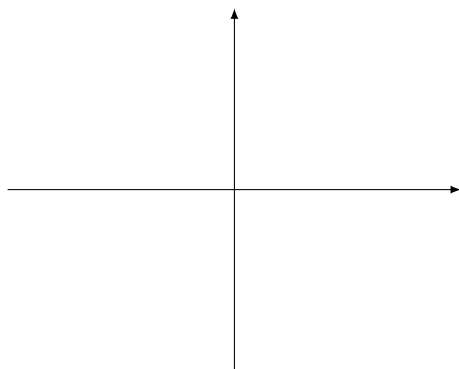
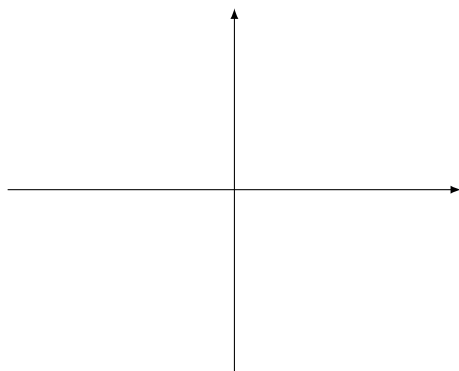
27. §2.2: 35 (trees) What are the units for $H'(x)$? When do the trees grow the fastest?

28. §2.2: 40 (differentiability)

29. §2.2: 28 (Hint: Ask your instructor or TA to show you Pascal's triangle)

30. Let $f(x) = x + 1/x$.

- (a) Use superposition of x and $1/x$ to sketch the graph of f on the first set of axes below. Then sketch the graph of f' on the second set of axes.



(b) Use the definition of derivative to find $f'(x)$.

(c) Use superposition to sketch the graph of f' from the formula you found in part (b), and check that it agrees with your graph of f' in part (a).

31. Let $f(x) = \sqrt{x}$. Use the definition of derivative to find $f'(x)$ for $x > 0$. Sketch the graph of f and f' . Is f differentiable at $x = 0$?

32. A particle moving along a horizontal line has position $s(t)$, where s is measured in meters, and t is measured in seconds. Give the physical meaning and units of

(a) $s'(t)$

(b) $s''(t)$