MTH 495/595 In-Class final review answers – If you see any mistakes, email me and get extra credit!

1. $x = \frac{3}{2}$
2. positive
3. 18
4. $\int_{-3}^{3} (-2x+3)dx = -x^2 + 3x\Big|_{-3}^{3} = 0-(-18) = 18$
5. $\int_{1}^{3} f(x)dx$
6. d,b,a,c
7. c,d,b,a
8. 14
9. $f'(3) = 12$
10. local max at x=2; local min at x=-2
11. x=0
12. F
13. B
14. t=0 to t=1
15. B. The definite integral of the velocity between t=0 and t=4 gives distance traveled in the first four seconds. The definite integral is the area under the curve. Clearly there is more area under the curve for Particle B.
16. Yes, the graph has no holes, jumps or vertical asymptotes that would make it discontinuous; basically, the graph can be drawn without picking my pencil up off of the paper.
17. No, it is not differentiable at x=0 or x=2. At each of these points, the slope of the tangent line as you approach the point from the left does not equal the slope of the tangent line from the right.
18. 1
19. $\frac{4}{3}x^{\frac{3}{2}} + C$
20. $-3\cos(x) - \frac{x^3}{3} + C$
21. $\frac{13}{2}$
22. $\frac{1}{8}$
23. $6x\cos(x) - 3x^2\sin(x)$
24. $\frac{(x^3+x)(2e^x) - (2e^x)(3x^2+1)}{(x^3+x)^2}$
25. $\frac{3x^2-2}{2\sqrt{(x^3-2x+5)}}$

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26. -2 miles/minute = -120 miles/hour. That is really fast for riding his bike or walking or even driving. Maybe he is flying over his house in a plane ☺
27. I would sketch a tangent line to the graph at t=1 and estimate the slope in order to compute Eugene's speed at 1 second. The calculus concept is the instantaneous rate of change.
28. Eugene is going faster and faster. I can tell because the slopes of the tangent lines are getting steeper and steeper.
29. Answers may vary – check that all conditions are satisfied by your graph
30. B
31. H
32. A
33. H (if there was a choice for "inflection point" that would be correct)
34. C
35. Domain: $|x| > 1$; Range $y > 0$