MATH 132, SEC. 21, SAMPLE MIDTERM 3 ANSWERS

1. Maximum $(\sqrt{2}, 2)$, Minimum $(0, 0)$.

2. The car's position $s(t)$ is a smooth function with respect to time, so we can apply the Mean Value Theorem. The Mean Value Theorem states that there is some time where the derivative $s'(t) = v(t)$ equals the average speed for the trip.

3. a. Domain: $x \neq 2$. VA $x = 2$. HA $y = 1$. b. Roots: $x = 0, 1$. c. Decreasing $(-\infty, \frac{2}{3})$, Increasing $(\frac{2}{3}, 2)$, Decreasing $(2, \infty)$. Local minimum $x = \frac{2}{3}$. d. Concave down $(-\infty, 0)$, Concave up $(0, 2)$, Concave up $(2, \infty)$. Inflection point $x = 0$.

4. Maximize $\frac{1}{2}ab$ subject to constraint $a^2 + b^2 = 20^2$.

5. $18 \times 18 \times 36$

6. a. 0 b. 0

7. $x_0 = 0, x_1 = 1, x_2 = .75$

8. a. $\frac{1}{5}x^5 - \frac{1}{2}x^4 + 7x + C$ b. $\frac{2}{3}x^{3/2} + \frac{3}{4}x^{4/3} + C$ c. $-\frac{1}{3}\cos(3x) + C$