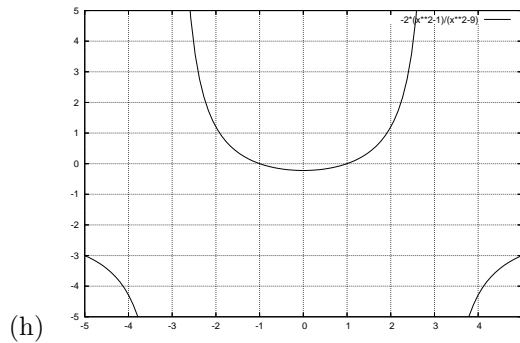


2005 Fall MTH142  
Midterm Exam 1 Answers

1. (a) domain:  $x \neq \pm 3$
- (b)  $x$ -intercepts:  $\pm 1$ ,  $y$ -intercept:  $-\frac{2}{9}$
- (c) horizontal asymptote:  $y = -2$
- (d) vertical asymptotes:  $x = \pm 3$
- (e) increasing:  $0 < x < 3$  or  $3 < x$ , decreasing:  $x < -3$  or  $-3 < x < 0$
- (f) local minimum at  $x = 0$
- (g) concave up:  $-3 < x < 3$ , concave down:  $x < -3$  or  $3 < x$



2.  $12 \times 6$ , use either the first or second derivative test to check that this yields the absolute maximum area
3. (a)  $-\frac{5}{4}$
- (b) Use Newton's Method with  $f(x) = x^2 - 2$  and  $x_1 = 1$  or  $x_1 = 2$  until the first eight decimal places of  $x_n$  and  $x_{n+1}$  agree.
4. (a)  $v(t) = -32t + 64$
- (b)  $s(t) = -16t^2 + 64t + 80$
- (c) 144 ft
- (d) 5 s
5. (a) 36, underestimate
- (b) 100, overestimate
- (c)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{4i}{n}\right)^3 \frac{4}{n}$  (using right endpoints)
- (d) 64
6. (a)  $\frac{9\pi}{4}$
- (b) 5

7. (a)  $-8$   
(b)  $4$
8. (a)  $e^{x^3}$   
(b)  $7x^6 \cos(x^7)$   
(c)  $2x \sin(x^2) - \sin x$
9. (a)  $2$   
(b)  $\ln 2$   
(c)  $e - 1$
10. (a)  $\frac{4}{7}x^{\frac{7}{2}} - \frac{2}{3}x^{\frac{3}{2}} + C$   
(b)  $\sec x + C$   
(c)  $7 \arctan x + C$
11. (a)  $\frac{2}{3}$   
(b)  $2$