1. Find the absolute minimum value of $y = 7x^2 + \frac{14}{x}$ on the interval $[\frac{1}{2}, 14]$.

   a) 14
   b) 28
   c) 7
   d) 21
   e) 0

2. Find the critical numbers of the function $F(x) = x^4(x-5)^3$.

   a) $0, 4, \frac{20}{11}$
   b) $0, 5, \frac{20}{7}$
   c) $0, 4, \frac{20}{7}$
   d) $0, 5, \frac{20}{11}$
   e) $3, 4, 5$

3. Find $\lim_{x\to\infty}(\sqrt{x^2+3x} - \sqrt{x^2-8x})$.

   a) 11
   b) -5
   c) $\frac{11}{2}$
   d) $\sqrt{3} + \sqrt{8}$
   e) $-\frac{5}{2}$

4. Find the number c that satisfies the conclusion of the Mean Value Theorem for the function $f(x) = 9x^2 + 5x + 6$ on the interval $[-5, 5]$.

   a) $c = 0$
   b) $c = 5$
   c) $c = 9$
   d) $c = 6$
   e) $c = \frac{5}{2}$

5. A particle moves along the curve $y = \sqrt{8+x^3}$. As it reaches the point $(2, 4)$, the y-coordinate is increasing at a rate of 5 cm/s. How fast is the x-coordinate of the point changing at that instant?

   a) $\frac{13}{3}$ cm/s
   b) $\frac{8}{3}$ cm/s
   c) $\frac{7}{3}$ cm/s
   d) $\frac{10}{3}$ cm/s
   e) $\frac{3}{8}$ cm/s

6. A farmer with 100 feet of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle. What is the largest possible total area of the four pens?

   a) 100 ft^2
   b) 250 ft^2
   c) 200 ft^2
   d) 500 ft^2
   e) 400 ft^2

7. Find an equation of the slant asymptote for $y = \frac{3x^3 - x^2 - 2}{x^2 + 3x - 3}$.

   a) $y = x$
   b) $y = 3x - 3$
   c) $y = x - 3$
   d) $y = x - 10$
   e) $y = 3x - 10$

8. Evaluate $\lim_{x\to\infty} \frac{x+8}{x^2 - 2x + 7}$.

   a) ∞
   b) $\frac{8}{7}$
   c) 8
   d) 0
   e) 7

9. Find the intervals of increase or decrease of the function $f(x) = x^3 - 12x^2 + 36x$.

   a) $f(x)$ is increasing on $(2, 6)$, and decreasing on $(-\infty, 2)$ and $(6, \infty)$.

   b) $f(x)$ is increasing on $(6, 18)$ and decreasing on $(-\infty, 2)$ and $(18, \infty)$.

   c) $f(x)$ is increasing on $(-\infty, 2)$ and $(6, \infty)$, and decreasing on $(2, 6)$.

   d) $f(x)$ is increasing on $(-\infty, 6)$ and $(18, \infty)$, and decreasing on $(6, 18)$.

   e) $f(x)$ is increasing on $(-\infty, 0)$ and decreasing on $(0, \infty)$.

10. Find the x-coordinate of the points on the ellipse $16x^2 + y^2 = 16$ that are farthest away from the point $(1, 0)$.

    a) $-\frac{1}{15}$

    b) $-\frac{1}{16}$

    c) $-\frac{1}{14}$

    d) $\frac{1}{14}$

    e) 16

11. If $y = 2x^3 + 2x$ and $\frac{dx}{dt} = 5$, find $\frac{dy}{dt}$ when $x = 2$.

    a) 130

    b) 131

    c) 140

    d) 122

    e) 125

12. Which one of the following statements is correct for the function $f(x) = 20x^3 - 3x^5$?

    a) The graph of $y = f(x)$ has a local minimum at $(-1, -17)$.

    b) The graph of $y = f(x)$ has a local maximum at $(2, 64)$.

    c) The graph of $y = f(x)$ has a vertical asymptote at $x = 3$.

    d) The graph of $y = f(x)$ is symmetric about the x-axis.

    e) The graph of $y = f(x)$ is symmetric about the y-axis.

13. Find the linearization $L(x)$ of $f(x) = \frac{1}{\sqrt{7+x}}$ at $a = 0$.

    a) $L(x) = \frac{1}{\sqrt{7}} - \frac{x}{14\sqrt{7}}$

    b) $L(x) = \sqrt{7} - 14\sqrt{7}x$

    c) $L(x) = \frac{1}{\sqrt{7}} + \frac{x}{14\sqrt{7}}$

    d) $L(x) = -\frac{1}{\sqrt{7}} + \frac{x}{14\sqrt{7}}$

    e) $L(x) = -\sqrt{7} - x$

14. Find the critical numbers of $f(x) = \frac{x}{x^2 + 49}$.

    a) $49, -49$

    b) $7, 0$

    c) $7, -7$

    d) $0, -7$

    e) $0, 2$

15. Compute $\triangle y$ and dy for $y = x^2$ at $x = 7$ and $\triangle x = 0.5$.

    a) $\triangle y = 8.25, dy = 7$

    b) $\triangle y = 7.25, dy = 7$

    c) $\triangle y = 8.25, dy = 8$

    d) $\triangle y = 7.25, dy = 8$

    e) $\triangle y = 7.25, dy = 0.5$

16. If $f(1) = 14$ and $f'(x) \geq 4$ for $1 \leq x \leq 8$, how small can $f(8)$ be?

a) 42

b) 72

c) 77

d) 27

e) 8

17. (10 pts.) A police cruiser, approaching a right-angled intersection from the north, is chasing a speeding car that has crossed the intersection and is now moving straight east. When the cruiser is 0.6 mile north of the intersection and the car is 0.8 mile to the east, the police determine with radar that the distance between them and the car is increasing at 20 miles per hour. If the cruiser is moving at 60 miles per hour at the instant of measurement, what is the speed of the car?

18. (10 pts.) A farmer has 200 meters of fence with which to construct three sides of a rectangular pen; an existing long, straight wall will form the fourth side. What dimensions will maximize the area of the pen?

FALL 06 MATH 140 EXAM 2

ITEM NO.	FORM: A
1	D
2	B
3	C
4	A
5	D
6	B
7	E
8	D
9	C
10	A
11	A
12	B
13	A
14	C
15	B
16	A

17. 100 meters x 50 meters

18. 70 mph (don't forget to verify, etc.)