Answers

EXAM I SECTION I PART A

1.	A	11.	A	21.	C
2.	B	12.	D	22.	E
3.	E	13.	C	23.	D
4.	E	14.	B	24.	D
5.	E	15.	B	25.	B
6.	D	16.	E	26.	B
7.	A	17.	C	27.	C
8.	D	18.	C	28.	E
9.	B	19.	B		
10.	B	20.	A		

EXAM I SECTION I PART B

1.	D	7.	B	13.	C
2.	C	8.	B	14.	C
3.	B	9.	C	15.	B
4.	E	10.	C	16.	D
5.	D	11.	E	17.	E
6.	D	12.	E		

EXAM I SECTION II PART A

1. a) -3 b) $\frac{3}{2}$ c) i) 0 ii) $-\frac{9}{2}$ d) 4

2. a) $(1, 5)$ b) $(-1, 5)$

c) $A = \int_{-2}^{1} (-x+6-f(x))\,dx = 6.75$

$B = \int_{-1}^{1} (5-f(x))\,dx = 4 \qquad A - B = 2.75$

$$\frac{4}{2.75} = \frac{16}{11}$$

EXAM I SECTION II PART B

3. a) $0.4\,ft/\sec^2$ b) 1300 ft c) car A is faster

4. c) $y = x - 1$

d) $y = x - 1 + Ce^{-x} \Rightarrow x - y = 1 - Ce^{-x}$

$$\frac{dy}{dx} = \frac{d(x - 1 + Ce^{-x})}{dx} = 1 - 0 + Ce^{-x}$$

$$= 1 + Ce^{-x}$$

5. a) $y = 2x - 5$ b) $x = 1$ c) 0.75
d) $x = -3, -1, 3$ e) $x = 4$

6. a) $A = \sin(\text{Arccos } k) - k \text{ Arccos } k$

b) $\frac{\sqrt{3}}{2} - \frac{\pi}{6}$ c) $\frac{dA}{dt} = -\frac{1}{3}$

EXAM II SECTION I PART A

1.	C	11.	C	21.	D
2.	A	12.	B	22.	A
3.	B	13.	A	23.	C
4.	C	14.	D	24.	B
5.	D	15.	A	25.	B
6.	C	16.	C	26.	E
7.	E	17.	C	27.	A
8.	A	18.	E	28.	E
9.	B	19.	B		
10.	D	20.	D		

EXAM II SECTION I PART B

1.	E	7.	E	13.	D
2.	D	8.	A	14.	D
3.	D	9.	A	15.	B
4.	C	10.	A	16.	C
5.	C	11.	D	17.	D
6.	A	12.	C		

EXAM II SECTION II PART A

1. a) 1.764 b) 30.460 c) 3.671

2. a) 1004 gals

b) 39.541

c) 1073.99 gals

EXAM II SECTION II PART B

3. a) 0 b) $\frac{1}{6}$ c) $y = \frac{1}{6}(x-1)$ d) $\left(\frac{1}{4}, \infty\right)$

4. a) $-1\,\text{miles}/\text{min}^2$ b) $t = 4$ and $t = 7$
c) 8 d) $1/5\,\text{miles}/\text{min}^2$

5. a) $y = 3x + 5$ b) rel max $x = 2$
c) $x = 0, 4$ d) $f(2) = 8$

6. a) $x < -\sqrt{\frac{b}{a}}$ or $x > \sqrt{\frac{b}{a}}$

b) Rel max at $\left(-\sqrt{\frac{b}{a}}, -2\sqrt{ab}\right)$

Rel min at $\left(\sqrt{\frac{b}{a}}, 2\sqrt{ab}\right)$

c) $x > 0$ d) no inflection point.

Answers

EXAM III SECTION I PART A

1.	A	11.	A	21.	D
2.	C	12.	A	22.	C
3.	E	13.	C	23.	E
4.	E	14.	D	24.	D
5.	C	15.	B	25.	D
6.	C	16.	E	26.	C
7.	D	17.	C	27.	C
8.	D	18.	C	28.	E
9.	D	19.	A		
10.	E	20.	D		

EXAM III SECTION I PART B

1.	A	7.	C	13.	E
2.	B	8.	D	14.	C
3.	B	9.	C	15.	A
4.	D	10.	C	16.	B
5.	E	11.	C	17.	E
6.	C	12.	B		

EXAM III SECTION II PART A

1. a) (0, 0), (0.964, 0), (1.684, 0)
   b) (0, 0.398), (1.351, 3)
   c) min = −0.098, max = 1.366
2. a) 81 feet b) avg = 8
   c) $v(t) = 22e^{(\frac{1}{2}\ln\frac{14}{22})\cdot t} \approx 22e^{-0.226\cdot t}$

EXAM III SECTION II PART B

3. a) $\frac{16}{3}$ b) $\frac{56}{3}\pi$ c) Volume $= \frac{\pi}{8}\int_{-1}^{3}(x+1)\,dx$
4. a) $p = -2,\ q = 5$ b) $p = -6$
   c) $p^2 < 3q$
5. a) $\frac{y}{y^2 - x}$ b) At (1,2), $\frac{dy}{dx} = \frac{2}{3}$
   Tangent line: $y - 2 = \frac{2}{3}(x - 1)$; $y(1.3) \approx 2.2$
   c) $\frac{d^2y}{dx^2} = -\frac{4}{27}$
   d) overestimate
6. a) A(2) = 8 b) $p = \frac{2}{\sqrt{3}}$

EXAM IV SECTION I PART A

1.	A	11.	E	21.	B
2.	E	12.	B	22.	D
3.	D	13.	D	23.	C
4.	B	14.	D	24.	A
5.	C	15.	C	25.	A
6.	C	16.	E	26.	C
7.	E	17.	D	27.	D
8.	A	18.	D	28.	D
9.	D	19.	A		
10.	B	20.	D		

EXAM IV SECTION I PART B

1.	D	7.	B	13.	B
2.	D	8.	B	14.	C
3.	E	9.	D	15.	B
4.	D	10.	D	16.	D
5.	B	11.	C	17.	B
6.	C	12.	B		

EXAM IV SECTION II PART A

1. a) t = 8 b) t = 4 and t = 11
   c) 2π+11 d) 2π − 4
2. a) decreasing at 1 ft/sec
   b) distance is incr. at 1.471 ft/sec
   c) closest to balloon at $t = 44$ sec

EXAM IV SECTION II PART B

3. a) $\frac{25}{12}$ b) ln 5
   c) $\sqrt{5} - 1$ d) Volume $= \frac{\sqrt{3}}{4}\int_0^4 \left(\frac{1}{x+1}\right)^2 dx$
4. a) i) $x = \frac{7}{6}\pi$ ii) $x = 0$
   b) $\left(\frac{\pi}{2}, \frac{3}{2}\pi\right)$ c) π
5. c) $-\frac{3}{8}$ d) $y = -\sqrt{x^2 - 2x + 4}$.
6. a) 0 b) 2
   c) (−4,−3) and (−1, 2)
   d) $x = 1$

Answers

EXAM V SECTION I PART A

1.	B	11.	B	21.	B
2.	C	12.	D	22.	C
3.	C	13.	D	23.	D
4.	C	14.	A	24.	D
5.	D	15.	C	25.	B
6.	A	16.	B	26.	D
7.	E	17.	D	27.	A
8.	D	18.	E	28.	A
9.	A	19.	B		
10.	A	20.	B		

EXAM V SECTION I PART B

1.	C	7.	D	13.	C
2.	C	8.	B	14.	E
3.	B	9.	E	15.	D
4.	E	10.	B	16.	D
5.	D	11.	E	17.	B
6.	C	12.	D		

EXAM V SECTION II PART A

1. a) 8.3176

   b) $v(1) = e - \frac{1}{2} > 0$ so it moves to the right at $e - \frac{1}{2} \approx 2.218$ ft/sec.

   c) $t > 0.1756$ d) $x(.1756) = 0.7729$

2. a) 68.236 gals b) t = 6 hours
   c) 220.116 gals c) decreasing

EXAM V SECTION II PART B

3. a) $2 - \frac{2}{e^k}$ b) $2\pi\left[1 - \frac{1}{e^{2k}}\right]$
   c) 2π

4. c) $y = C\sqrt{x^2+4}$ d) $y = 2\sqrt{x^2+4}$

5. a) 10 b) $x = -3, 1, 3$
   c) (–6, –4) and (1, 3) d) 10

6. a) $x < -1$ or $x > 0$ b) $\frac{1}{x(x+1)}$
   c) $y - \ln 0.5 = 0.5(x-1)$ d) $\frac{e^x}{(1-e^x)^2}$

EXAM VI SECTION I PART A

1.	A	11.	E	21.	C
2.	C	12.	E	22.	C
3.	B	13.	D	23.	C
4.	E	14.	D	24.	B
5.	C	15.	D	25.	C
6.	A	16.	A	26.	D
7.	C	17.	A	27.	C
8.	E	18.	E	28.	E
9.	D	19.	B		
10.	B	20.	C		

EXAM VI SECTION I PART B

1.	E	7.	A	13.	A
2.	C	8.	B	14.	D
3.	C	9.	B	15.	B
4.	C	10.	D	16.	C
5.	E	11.	C	17.	B
6.	D	12.	E		

EXAM VI SECTION II PART A

1. a) 47.4 metric tons of air pumped out

   b)Yes. Since $R(2) = R(6)$, the MVT guarantees a time t between $t = 2$ and $t = 6$ where $R'(t) = 0$.

   c) 5.833 metric tons per hour1.

2. a) 1.5 b) $s(t) = 1 + t + \ln\sqrt{1+t^2}$
   c) 1 d) 95.441

EXAM VI SECTION II PART B

3. a) 36 b) $\frac{27}{8}$ c) 24π

4. a) 24 ft/sec^2 b) 7 seconds
   c) 336 ft d) 448 ft

5. b) $b = -2$
   c) $g'(x) = 2x - y$ and $g'(0) = 0$
   $g''(x) = 2 - y' = 2 - 2x + y$
   at (0, 0) $g''(0) = 2$ $\therefore$ rel. min.

6. a) The graph of H is the graph of G moved up 3.5 units.
   b) (–5, –3) and (1, 5)
   c) $x = -3$
   d) (–2, 3)