Answers

EXAM I

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

EXAM II

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

EXAM I Section II Part A

1. (a) ≈ 0.902 sec

   (b) $x = 5, y = 12,\ t = 0.247,\ \frac{dx}{dt} = 18.827$ ft/sec

2. (a) $g'(0) = 1$ (b) $g'(1) > 0 \Rightarrow g$ is increasing

   (c) $g''(0) \approx 7$ (d) $g''(1) > 0 \Rightarrow g$ – graph concave up

EXAM I Section II Part B

3. (a) $2\cdot\frac{1}{2}\int_0^{\pi}(2-\cos\theta)^2\,d\theta$

   (b) $dx/d\theta = -2\sin\theta + 2(\cos\theta)(\sin\theta)$

   $dy/d\theta = 2\cos\theta - \cos^2\theta + \sin^2\theta$

   (c) $\frac{dy}{dx} = \frac{2\cos\theta - \cos^2\theta + \sin^2\theta}{-2\sin\theta + 2(\cos\theta)(\sin\theta)}$

4. (a) all x (b) $1 - \frac{x^2}{2!} - \frac{x^4}{4!} - \cdots + \frac{(-1)^n x^{2n}}{(2n)!}$

   (c) $g'(x) = \cos x,\ f(x) = \begin{cases} \frac{1-\cos x}{x^2} & \text{if } x \neq 0 \\ 1/2 & \text{if } x = 0 \end{cases}$

   (d) $g(x) = \sin x + 3$

5. (a) $-\frac{2}{\sqrt{t+1}}$ (b) $x + y = \frac{5}{4}$

   (c) $\int_0^1 \sqrt{\frac{1}{4(t+1)^3} + \frac{1}{(t+1)^4}}\,dt$ (d) $y = 1 - x^2, 0 < x \leq 1$

6. (a) $P(t) = 1200 - 900e^{-kt}$

   (b) $k = -\frac{\ln(2/3)}{4} = \frac{1}{4}\ln\frac{3}{2}$

   (c) $\lim_{t\to\infty} P(t) = 1200$

EXAM II Section II Part A

1. (a) $v(t) = 1 - t(\cos t) - (\ln t)(\sin t)$

   (b) $\max|v(t)| = 5.896$ when $t = 6.700$

   (c) $5.204 < t < 7.987$ (d) 21.461

2. (a) decreasing at 0.0375 ft per ft

   (b) 27.772 cu ft (c) $w = 1.155$ ft, $h = 1.633$ ft

EXAM II Section II Part B

3. (a) $2 + \ln 3$ (b) $4\pi k\left(1 + \frac{k}{6}\right)$

   (c) $\pi\int_1^3 \left[x + \frac{k}{x} + 2\right]^2 - [x+2]^2\,dx$

4. (a) -3 (b) 4 (c) 33

5. (a) $\frac{1}{k}$ (b) $\left(\frac{1}{k}, \frac{1}{ke}\right)$ is a rel max

   (c) $x > \frac{2}{k}$ (d) $y = 0$

6. (a) $f'(0) = 1, f''(0) = -1, f'''(0) = 2$

   (b) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots + \frac{(-1)^{n+1}x^n}{n} + \cdots$

   (c) 1

EXAM III

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

EXAM III Section II Part A

1. (*a*) -3.75

   (*b*) $y-2.6 = -3.75(x-1.4)$

   (*c*) $f''(1.4) > 0$

   (*d*) $.04[f(1.2)+f(1.6)] = 2.2$

2. (a) $(\sqrt{2},1)$, $(-\sqrt{2},-1)$

   (b) product of slopes $= -1$ (c) 1.737

EXAM III Section II Part B

3. (a) 10 (b) $x = -3,1,3$

   (c) $(-6,-4)$ and $(1,3)$

   (*d*) $H'(4) = f'[3]\cdot 5 = 2\cdot 5 = 10$

4. (a) diverges (b) $-\frac{1}{3} \le x < \frac{1}{3}$

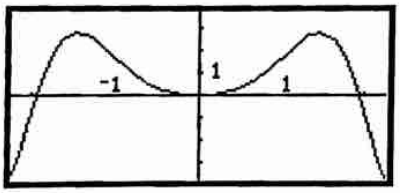
5. (a) $v(t) = \frac{-6}{\sqrt{2t+1}} + 3$ (b) 1.5

   (c) $s(t) = -6\sqrt{2t+1} + 3t + 15$ (d) 3

6. (a) $h(-x) = h(x)$ (b) $-\sqrt{5} \le x \le \sqrt{5}$

   (c) -12 (d) $\pm\sqrt{2}$

   (e)



EXAM IV

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

EXAM IV Section II Part A

1. (a) rel min at $x = -0.364$ and $x = 1.977$
   rel max at $x = 0.487$

   (b) $-0.364 < x < 0.487$ and $x > 1.977$

   (c) $0.043 < x < 1.092$ (d) 1.097 units^2

2. (a) $\frac{2}{3}\cot t$ (b) $2x - 3y + 5 + 6\sqrt{2} = 0$

   (c) 3.757

EXAM IV Section II Part B

3. (a) 0.4 ft / sec^2

   (b) 1300 feet

   (c) Car A is traveling faster

4. (a) $1 + x^2 + \frac{x^4}{2!} + \frac{x^6}{3!} + \frac{x^4}{4!} + \cdots + \frac{x^{2n}}{n!}$

   (b) converges for all x (radius is infinite)

5. (a) $y = \left(C - \frac{kt}{2}\right)^2$ (b) $y(t) = \left(3 - \frac{t}{20}\right)^2$

   (c) 40 min

6. (a) 1.5 (b) $2 < x < 2.5$

   (c) $G(3) > 0$ and $G(4) < 0$ so by the Intermediate Value Theorem, G has a zero in $[3,4]$. $G'(x) < 0$ on $[3,4]$, so G is monotone, decreasing and has only one zero in $[3,4]$.

   (d) $y - 1.5 = -1(x-3)$

Answers

EXAM V

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

EXAM VI

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

EXAM V Section II Part A

1. (a) $y - e^a = e^a(x-a)$ $R = (a-1, 0)$ (b) $A = \frac{1}{2}e^a|a-1|$

   (c) Area max when $a = 0$. $A'(0) = 0$ and $A''(0) < 0$

   $A(-1) = 0.368$, $A(0) = 0.5$, $A(1) = 0$

2. (a) $R_n = \sum_{k=1}^{n}\left(1\cdot\Delta x_k \cdot \frac{1}{1+x_k}\right)(x_k)^2$ When $n = 4$, $\Delta x = 1$, $x_1 = 0$

   $R_4 = (1\cdot1\cdot1)(0)^2 + (1\cdot1\cdot\frac{1}{2})(1)^2 + (1\cdot1\cdot\frac{1}{3})(2)^2 + (1\cdot1\cdot\frac{1}{4})(3)^2 = \frac{49}{12}$

   (b) $\lim_{n\to\infty}\sum_{k=1}^{n}\left(1\cdot\Delta x_k \cdot \frac{1}{1+x_k}\right)(x_k)^2 = \lim_{n\to\infty}\sum_{k=1}^{n}\frac{(x_k)^2}{1+x_k}\Delta x = \int_0^4 \frac{x^2}{1+x}dx$

   (c) $\int_0^4 \frac{x^2}{1+x}\,dx = 5.609$ grams

EXAM V Section II Part B

3. (a) $T_3(x) = \frac{1}{3}(x-2) + \frac{1}{18}(x-2)^2 + \frac{1}{81}(x-1)^3$

   (b) Interval of convergence is all x for which $-1 \le x < 5$.

4. (a) $\frac{dy}{dx} = \frac{2x}{3y^2+2y-5}$ (b) $y - 0 = -\frac{4}{5}(x-2)$

   (c) vertical $x = \pm1$, or $\pm\sqrt{\frac{283}{27}}$ horizontal $x = 0$

5. (a) $x = 10$ (b) $5 < x < 12.5$

   (c) critical points (10, 60) and (15, 47.5)
   inflection points (5, 35) and (12.5, 53.75)

6. (b) $|y| = 2e^{x^2/4}$ (c) $y = 2e$

   (d) $y = 3$; exact: $y(2) = 5.437$

EXAM VI Section II Part A

1. (a) $6(1268 + 1316 + 1369 + 1451) = 32{,}424$ K

   (b) $\left(\frac{1369-1316}{6}\right) = 8.833$ K/hr^2

   (c) $\frac{1}{24}\int_0^{24}(1245 + 10te^{.25\cos t})\,dt = 1364.478$ K/hr

2. (a) $g(1/2) = 0.210$ (b) $g'(0) = 0.540$

   (c) $x = 0.903$ (d) $x = 2.290$ or $x = 3.676$

   (e) 0.269

EXAM VI Section II Part B

3. c) $-\frac{3}{8}$ d) $y = -\sqrt{x^2 - 2x + 4}$.

4. (a) $x(t) = \sqrt{t+1}$; $y(t) = 1 - \frac{1}{t+1}$ (b) $y = 1 - \frac{1}{x^2}$

   (c) $\frac{3}{32}$ (d) $\frac{2}{27}$

5. (a) $\frac{dy}{dx} = \frac{-e^x - \sin x}{2y-1}$ (b) $y = 1 - x$

   (c) At (0,1), $\frac{d^2y}{dx^2} = -4$ (d) $y(0.5) \approx 0.5$ (e) larger

6. (a) $\frac{1}{4} - \frac{x^2}{16} + \frac{x^4}{64} + \cdots = \sum_{n=0}^{\infty}(-1)^n\frac{x^{2n}}{2^{2n+2}}$ (b) R = 2

   (c) $\frac{1}{4}x - \frac{x^3}{48} + \frac{x^5}{320} - \cdots = \sum_{n=0}^{\infty}(-1)^n\frac{x^{2n+1}}{(2n+1)2^{2n+2}}$

   (d) Let $x = 2$