Math 131 Exam 3 Review Key

1a) $\frac{1}{80}$ b) $\frac{1}{160}$ c) $\frac{17}{6}$

2 a) Abs. Min -4 at $x = -2$.
Abs. Max 7 at $x = -7$.

b) Abs Min -20 at $x = 2$
Abs Max 32 at $x = 4$

3) Neither. $\lim_{x \to 0^-} \frac{e^x}{x} = -\infty$ $\lim_{x \to 0^+} \frac{e^x}{x} = \infty$

The theorem only guarantees an absolute max and absolute min on $[a, b]$ if f is continuous on $[a, b]$.

4)

x	0	1	2	3	4
f	increasing concave up	decreasing	no conclusion	local min	local max

5) a) local min at $t = 2$

b) local max at $t = 3$

c) no conclusion

6) $f(v) = .005v^2 + 20$ g has a min at $v = 20\sqrt{10} \approx 63$ mph

7) $w = 3$ $\ell = 6$ $h = 2$

8 a) $L_3 = \frac{\pi}{12}(1+\sqrt{3})$ $R_3 = \frac{\pi}{12}(3+\sqrt{3})$

$avg = \frac{\pi}{12}(2+\sqrt{3})$

b) $L_3 = \frac{166}{27}$ $R_3 = \frac{310}{27}$ $avg = \frac{238}{27}$

c) $L_4 = \frac{27}{4}$ $R_4 = \frac{43}{4}$ $avg = \frac{35}{4}$

9 a) 0 b) $\frac{\pi}{2}$ c) 14.5 d) $29+24\pi$

10 a) $f(t) = -\cos t + t + 2$

b) $f(t) = 3e^t + 2t + 4$

11 a) $\frac{5}{6}x^{6/5} + \frac{3}{5}x^{5/3} + C$

b) $\frac{4}{3}x^6 + 2x^4 + C$

c) $\frac{1}{4}x^4 + 5\ln|x| + C$

d) $\frac{3}{2}e^{2x} + C$

e) $\tan x + \sin x + C$

12 a) $\frac{5}{2}e^{x^2}+C$

b) $-\frac{1}{3}\cos(x^3+6x)+C$

c) $\frac{2}{5}(x-4)^{5/2}+4(x-4)^{3/2}+C$

d) $x-12(x+6)^{1/2}+C$

e) $-\ln|\cos x|+C=\ln|\sec x|+C$

f) $\frac{1}{2}\ln(x^2+1)+C$

13 a) $\frac{62}{3}$ b) $4/3$ c) $1/2$

d) $\frac{98}{3}$ e) -1

14 a) e^{-x^2} and $e^{-x^2}-1$

b) $(\ln x)^2$ and $(\ln x)^2-(\ln 2)^2$