Math 115 Fall 11 Final Answers

1) a) $105x^6 \tan(x) + 15x^7 \sec^2(x)$

b) $\dfrac{108}{(12x+3)^2}$

c) $-48 \cos(24x) \sin(24x)$

2) $(264)(x - 2) = y - 3$

3) a) Increasing on $(\sqrt{3}, \infty)$ and $(-\sqrt{3}, 0)$; decreasing on $(-\infty, -\sqrt{3})$ and $(0, \sqrt{3})$. Local mins at $x = \pm\sqrt{3}$; local max at $x = 0$

b) Concave up on $(-\infty, -1)$, $(1, \infty)$; concave down on $(-1, 1)$. Inflection points: $x = \pm 1$.

4) a) $-7x^6 + \dfrac{3}{4}x^8 + C$

b) 0

c) $\pi/20$

5) a) 0

b) does not exist

c) 64

6) a) $\lim\limits_{x \to a^+} f(x) = \lim\limits_{x \to a^-} f(x) = f(a)$.

b) No such k exists.

7) a) $f(0) = -19 < 0$, $f(1) = 4 > 0$, so by the intermediate value theorem, f has a root.

b) $f'(x) = 11x^{10} + 98x^6 + 8 \geq 8 > 0$, so f is always increasing and hence has only one zero.

c) About .9671

8) a) No, thanks.

b) $V = \pi h^3 / 48$

c) $3/\pi$ cm/s

9) a) No, thanks.

b) $\pi \int_6^7 (x - 6) - (x - 6)^{4/3} \; dx$

c) $\pi/14$.

10) a) No, thanks.

b) $A(x) = x \left(\dfrac{154}{x + 3} - 2 \right)$

c) $\sqrt{231}$ by $154/(\sqrt{231})$