Math 115 Winter 14 Final Answers

1) a) $4\sqrt{x}\sec^2(x) + \dfrac{2\tan(x)}{\sqrt{x}}$

b) $\dfrac{-3x^2 - 18x - 11}{(9 + 3x)^2}$

c) $-\dfrac{4}{3}(\cos(4x))^{-2/3}\sin(4x)$

2) $(-1 - 2\pi)x = y - \pi$

3) a) Absolute max at $x = 3/2$, value $843/128$. Absolute min at $x = 1$, value -6

b) Concave up on $(0, \infty)$; concave down on $(-\infty, 0)$. Inflection point: $x = 0$.

4) a) 130778.1

b) $\dfrac{4(x^2 + x + 17)^{3/4}}{3} + C$

c) $\dfrac{10\sqrt{2} - 11}{24}$

5) a) $\dfrac{1}{2}$

b) $2/17$

c) $-1/3$

6) a) $k = 7, -2$

b) $k = 7$.

7) a) We have that $f(\pi/4) = \dfrac{2\pi\sqrt{2} - \pi^2}{16} < 0$ and that $f(\pi/6) = \dfrac{3\sqrt{3}\pi - \pi^2}{36} > 0$, so since f is continuous, by the intermediate value theorem, f has a zero in $(0, \pi/2]$.

b) Approximately -.3102.

8) a) $\displaystyle\int_0^{\pi/2} |\cos(x^2)|\ dx$

b) $\displaystyle\int_0^{\pi/2} 2\pi x |\cos(x^2)|\ dx$

9) a) No.

b) $V = \dfrac{\pi h^3}{27}$

c) $\left(\dfrac{3}{4\pi}\right)^{1/3}$ in/s.

10) a) No, thanks.

b) $z = (10+x)\sqrt{400x^{-2}+1}$

c) $10(1+2^{2/3})^{3/2}$ feet