

**MATH 181**  
**Final Practice Problems – Answers**  
**Summer 2009**

1. (a)  $\ln|x-3| + \ln|x-2| + C$   
(b)  $\frac{2}{x} + \frac{3}{2}\ln|x| - \frac{3}{2}\ln|x+2| + C$
2. (a) converges to  $\frac{1}{4}$   
(b) converges to  $\frac{\pi}{4}$   
(c) converges to 100
3.  $\frac{20\sqrt{10}}{27} - \frac{2}{27}$
4.  $\frac{13}{4}$
5.  $T_5(x) = 2x - \frac{(2x)^3}{3!} + \frac{(2x)^5}{5!}$
6. (a)  $f(0) = 3$   
(b)  $f'(0) = -2$   
(c)  $f''(0) = 8$
7. (a) converges to 1  
(b) converges to 0  
(c) converges to 0
8. (a)  $\frac{5}{12}$   
(b)  $\frac{9}{625}$   
(c) 1
9. (a) diverges (easiest to use LCT with  $\sum \frac{1}{\sqrt{n}}$ )  
(b) converges (easiest use Leibniz Test or Ratio Test)  
(c) converges (easiest to use Ratio Test)  
(d) diverges (easiest to use Integral Test or Comparison Test with  $\sum \frac{1}{\sqrt{n}}$ )
10. conditionally convergent
11. (a)  $-\frac{9}{2} < x \leq -\frac{7}{2}$   
(b)  $1 - \frac{1}{\sqrt{3}} \leq x \leq 1 + \frac{1}{\sqrt{3}}$
12. radius is  $\frac{3}{2}$ , interval is  $-\frac{3}{2} \leq x \leq \frac{3}{2}$
13. (a)  $2x - \frac{(2x)^3}{3!} + \frac{(2x)^5}{5!} + \dots$   
(b)  $2(x-\pi) - \frac{8}{3!}(x-\pi)^3 + \frac{32}{5!}(x-\pi)^5 + \dots$

14.  $1 + 2x + (2x)^2 + (2x)^3 + \dots = \sum_{n=0}^{\infty} (2x)^n, |2x| < 1 \text{ or } |x| < \frac{1}{2}$

15. (a)  $t^2 - \frac{t^6}{3!} + \frac{t^{10}}{5!} - \frac{t^{14}}{7!} + \dots$

(b)  $\frac{x^3}{3} - \frac{x^7}{7 \cdot 3!} + \frac{x^{11}}{11 \cdot 5!} - \frac{x^{15}}{15 \cdot 7!} + \dots$

(c)  $\frac{(1/2)^3}{3} - \frac{(1/2)^7}{7 \cdot 3!} + \frac{(1/2)^{11}}{11 \cdot 5!} - \frac{(1/2)^{15}}{15 \cdot 7!} + \dots$