Answers to Worksheet 3 on Series

1. (a) $x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+\ldots+\frac{(-1)^n x^{2n+1}}{(2n+1)!}+\ldots$

   (b) $1-\frac{x^2}{3!}+\frac{x^4}{5!}-\frac{x^6}{7!}+\ldots+\frac{(-1)^n x^{2n}}{(2n+1)!}+\ldots$

   (c) $1-\frac{1}{6}\approx .83333$

   (d) (Your explanation should include the value $\frac{1}{120}$).

2. (Your explanation should include the value $\frac{1}{1152}$).

3. (a) $x=2$ is a local maximum since $f'(2)=0$ and $f''(2)<0$ by the Second Derivative Test.

   (b) -5

   (c) (You should be able to argue that the highest value $f(0)$ could have is -1).

4. (a) $-3+5(x-2)+\frac{3}{2}(x-2)^2-\frac{4}{3}(x-2)^3$; –4.958

   (b) (You should be able to show that the lowest value $f(1.5)$ could have is –4.966).

5. (Your explanation should include the value $\frac{1}{384}$).

6. (a) $\frac{2}{27}$

   (b) $\frac{47}{54}$ (this is a simplified answer). Your explanation for the second part should include the value $\frac{1}{108}$.

7. C

8. $\frac{1}{2^6\cdot 7!}$

9. (a) $e^x=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots+\frac{x^n}{n!}+\ldots$

   $xe^{x^3}=x+x^4+\frac{x^7}{2!}+\frac{x^{10}}{3!}+\ldots+\frac{x^{3n+1}}{n!}+\ldots$

   (b) $\frac{x^2}{2}+\frac{x^5}{5}+\frac{x^8}{16}+\frac{x^{11}}{66}$ (c) $\frac{500}{6!\cdot 2^6}$