MTH 112 **Test 5**
Fall 2018

Name _____ **Calculus II**

Justify all answers by showing your work or by providing a coherent explanation. and please circle your answers

1. Find the intervals of convergence for the following power series:

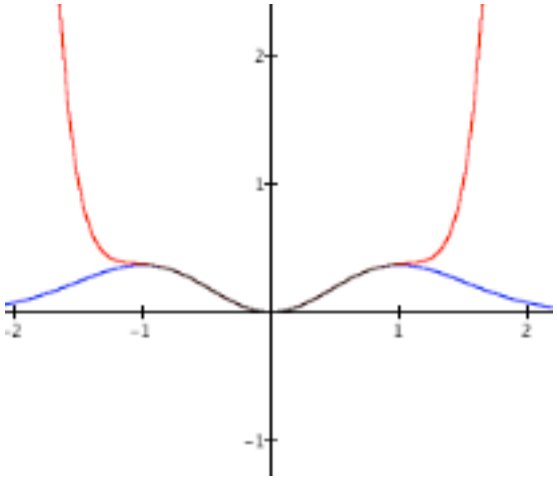
a) $\sum_{k=1}^{\infty} \frac{x^k}{\sqrt{k}}$.

b) $\sum_{k=0}^{\infty} k^k (x-5)^k$

c) $\sum_{k=1}^{\infty} \frac{(-1)^k k}{4^k}(x+3)^k$

d) $\sum_{k=1}^{\infty} \frac{3^k x^k}{k^2+1}$

2. **a)** Find the Maclaurin expansion of $f(x) = x^2 e^{-x^2}$ **and** determine the interval of convergence.



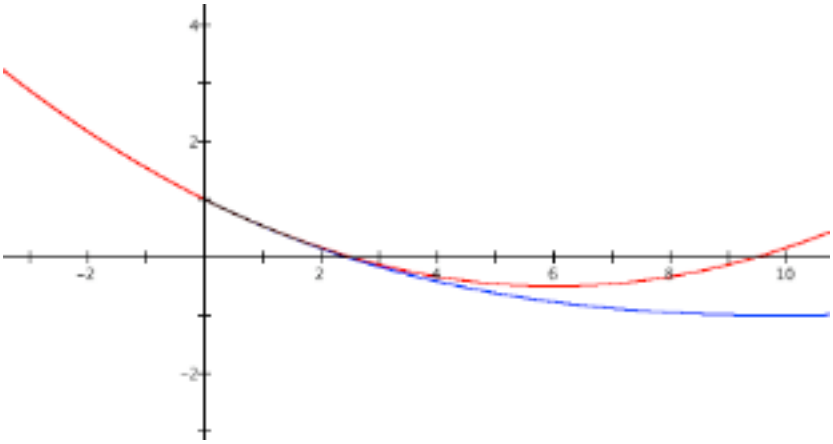
b) Using the first 5 terms from **a)** find the approximate value of

$$\int_0^1 x^2 e^{-x^2} dx$$

(Express your answer as a **numeric** expression.)

3. Use the first four nonzero terms for the power series expansion of $\sin x$ to obtain an approximation for $\sin(1)$.

4. Find the Maclaurin expansion of $f(x) = \cos\sqrt{x}$ **and** determine the interval of convergence.



5. Using Taylor's formula to find the power series expansion for $y = \dfrac{7}{x}$ around $x = 1$ we obtain the following series

$$\sum_{k=0}^{\infty} (-1)^k \, 7(x-1)^k$$

a) Show that the radius of convergence is 1.

b) Show that the interval of convergence is $(\,0,\,2\,)$.