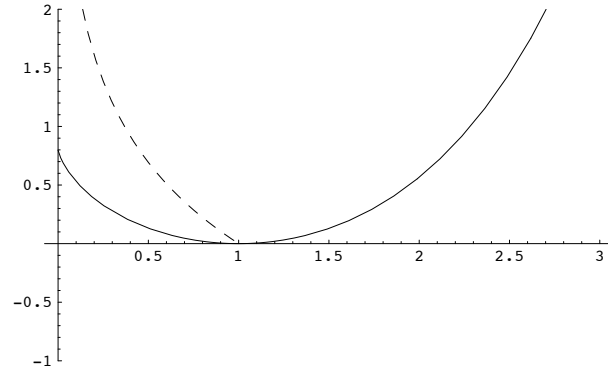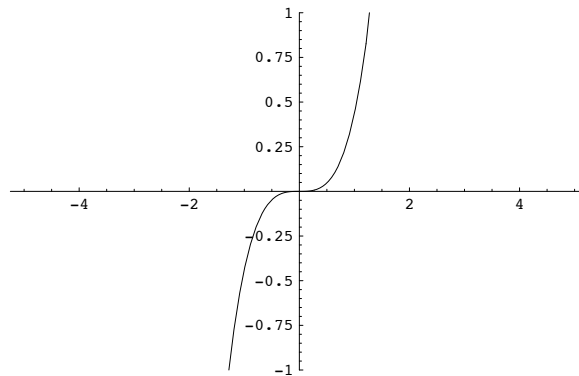**1.** $\displaystyle\sum_{n=0}^{\infty}(-1)^n\frac{2^{2n+1}}{(2n+1)!(2n+1)}$

2.

La funzione tratteggiata in figura è $-\log x$.

---

3. (i)

(ii)

$$y(x) = \begin{cases} 2e^x - (x^2 + 2x + 2), & \text{se} \quad x \geq 0\,, \\[2mm] -2e^{-x} + x^2 - 2x + 2, & \text{se} \quad x < 0\,. \end{cases}$$

---

4. $\displaystyle -\sum_{n=1}^{\infty}\frac{1}{n!n}$

---

5. $\displaystyle y(x) = \frac{\sqrt{3}}{25\sqrt{x^2-1}}\Big(1 + \sqrt[4]{27}(x^2-1)^{5/4}\Big)^2 \qquad x \in (1,+\infty)$

---

6. $\displaystyle y(x) = a_1 \sum_{n=0}^{\infty}\frac{(1-\alpha)(3-\alpha)\dots(2n-1-\alpha)}{(2n+1)!}x^{2n+1}$

---

7. $\displaystyle -\sum_{n=0}^{\infty}\frac{1}{2^{n+1}(n+1)^2}$

---

8. $\displaystyle y(x) = \frac{2}{25\sqrt{1-x^2}}\Big(3^{9/4} - 2\sqrt{2}(1-x^2)^{5/4}\Big)^2 \qquad x \in (-1,1)$

---

9. $y(x) = \dfrac{1}{Ce^{e^{4x}} - \frac{1}{4}e^{4x} - \frac{1}{4}} \qquad C \leq 0 \quad \text{o} \quad C \geq \dfrac{1}{4}$

---

10. $y(x) = \dfrac{1}{\sqrt{x^2-1}}\Big((x^2-1)^{5/4} - 2^{7/4}3\Big)^2 \qquad x \in (-\infty, -1)$
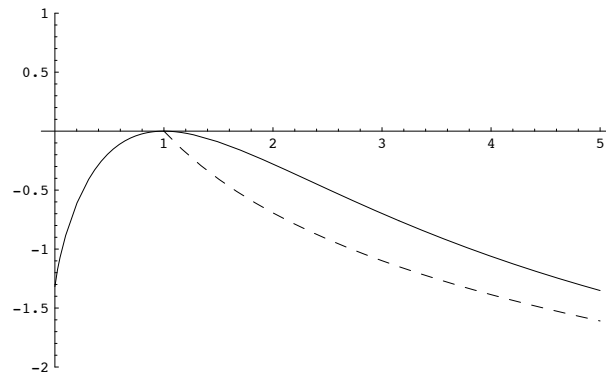
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11. $y(x) = \dfrac{1}{Ce^{e^{5x}} - \frac{1}{5}e^{5x} - \frac{1}{5}} \qquad C \leq 0 \quad \text{o} \quad C \geq \dfrac{1}{5}$

---

12. $y(x) = a_0 \displaystyle\sum_{n=0}^{\infty} \dfrac{(-\alpha)(3 \cdot 2 - \alpha)\ldots(3 \cdot (2n-2) - \alpha)}{(2n)!} x^{2n}$

13.

La funzione tratteggiata in figura è $-\log x$.

---

14. $\displaystyle\min_{(x,y,z)\in C} f(x,y,z) = -\dfrac{13}{4}, \qquad \max_{(x,y,z)\in C} f(x,y,z) = 2 + 3\sqrt{3}$

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15. $(0,0,0)$ punto di sella; $f\Big(\sqrt{\dfrac{3}{8}}, \sqrt{\dfrac{3}{8}}, 0\Big) = f\Big(-\sqrt{\dfrac{3}{8}}, -\sqrt{\dfrac{3}{8}}, 0\Big) = -\dfrac{9}{16}$ minimi relativi

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16. $\displaystyle\min_{(x,y)\in C} f(x,y) = -8, \qquad \max_{(x,y)\in C} f(x,y) = 8$