

(33) $f(x) = x e^{-x^2}$

$$f'(x) = 1 \cdot e^{-x^2} + x e^{-x^2} (-2x)$$

$$= e^{-x^2} (1 - 2x^2) = 0$$

$$1 - 2x^2 = 0 \quad 1 = 2x^2$$

$$x^2 = \frac{1}{2} \quad x = \pm \frac{1}{\sqrt{2}}$$

$$f''(x) = e^{-x^2} (-2x) (1 - 2x^2) + e^{-x^2} (-4x)$$

$$e^{-x^2} (-2x + 4x^3 - 4x)$$

$$e^{-x^2} (4x^3 - 6x) = 0$$

$f(-\frac{1}{\sqrt{2}})$ is min

$$2x(2x^2 - 3) = 0 \quad x = 0$$

$$2x^2 - 3 = 0$$

$$2x^2 = 3$$

$$x^2 = \frac{3}{2}$$

$$x = \pm \sqrt{\frac{3}{2}}$$

$-\sqrt{\frac{3}{2}}$ is POI

0 is POI

$\sqrt{\frac{3}{2}}$ is POI

