17. $y = f(x) = x\sqrt{5-x}$ **A.** The domain is $\{x \mid 5 - x \geq 0\} = (-\infty, 5]$ **B.** y-intercept: $f(0) = 0$; x-intercepts: $f(x) = 0 \Leftrightarrow x = 0, 5$ **C.** No symmetry **D.** No asymptote

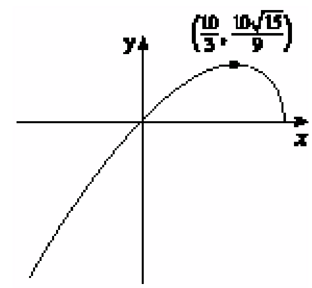
E. $f'(x) = x \cdot \frac{1}{2}(5-x)^{-1/2}(-1) + (5-x)^{1/2} \cdot 1 = \frac{1}{2}(5-x)^{-1/2}[-x + 2(5-x)] = \dfrac{10-3x}{2\sqrt{5-x}} > 0 \Leftrightarrow x < \frac{10}{3}$, so f is increasing on $\left(-\infty, \frac{10}{3}\right)$ and decreasing on $\left(\frac{10}{3}, 5\right)$.

F. Local maximum value $f\left(\frac{10}{3}\right) = \frac{10}{9}\sqrt{15} \approx 4.3$; no local minimum

G.
$$f''(x) = \frac{2(5-x)^{1/2}(-3) - (10-3x) \cdot 2\left(\frac{1}{2}\right)(5-x)^{-1/2}(-1)}{\left(2\sqrt{5-x}\right)^2}$$
$$= \frac{(5-x)^{-1/2}[-6(5-x) + (10-3x)]}{4(5-x)} = \frac{3x-20}{4(5-x)^{3/2}}$$

$f''(x) < 0$ for $x < 5$, so f is CD on $(-\infty, 5)$. No IP

H.



38. $y = f(x) = e^x/x$ **A.** $D = \{x \mid x \neq 0\}$ **B.** No intercept **C.** No symmetry **D.** $\displaystyle\lim_{x\to\infty} \frac{e^x}{x} \overset{\mathrm{H}}{=} \lim_{x\to\infty} \frac{e^x}{1} = \infty$, $\displaystyle\lim_{x\to-\infty} \frac{e^x}{x} = 0$, so $y = 0$ is a HA. $\displaystyle\lim_{x\to 0^+} \frac{e^x}{x} = \infty$, $\displaystyle\lim_{x\to 0^-} \frac{e^x}{x} = -\infty$, so $x = 0$ is a VA. **E.** $f'(x) = \dfrac{xe^x - e^x}{x^2} > 0 \Leftrightarrow (x-1)e^x > 0 \Leftrightarrow x > 1$, so f is increasing on $(1, \infty)$, and decreasing on $(-\infty, 0)$ and $(0, 1)$.

F. $f(1) = e$ is a local minimum value.

G. $f''(x) = \dfrac{x^2(xe^x) - 2x(xe^x - e^x)}{x^4} = \dfrac{e^x(x^2 - 2x + 2)}{x^3} > 0 \Leftrightarrow x > 0$ since $x^2 - 2x + 2 > 0$ for all x. So f is CU on $(0, \infty)$ and CD on $(-\infty, 0)$.

No IP

H.