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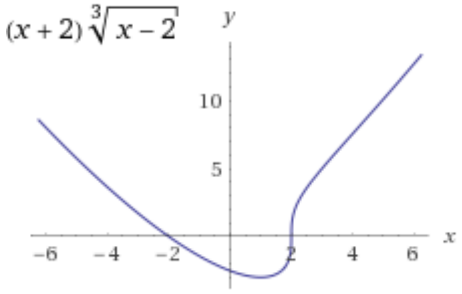
Test 3
(Version B)

Cal I (S) (Maths 201–NYA)

Answers

1. $y' = \dfrac{7x^3 + 3x^2}{\sqrt{2x+1}}$ $y'' = \dfrac{35x^3 + 30x^2 + 6x}{(2x+1)^{3/2}}$

2. Domain: all x
   No VA, no HA; intercepts: $x = \pm 2$, $y = -2\sqrt[3]{2} \cong -2.5$
   CP at $x = 1, 2$; PI at $x = 2, 4$.
   (vertical tangent at $x = 2$)
   Dec: $(-\infty, 1)$; Inc: $(1, \infty)$
   local (and global) min at $x = 1$ (where $y = -3$)
   $\bigcup$: $(-\infty, 2), (4, \infty)$; $\bigcap$: $(2, 4)$
   Graph at far right: (see version A for a larger similar graph)



3. $f'(x) = -1/x^2$ is never $= 1$. But f is not differentiable (nor continuous) on $(-1, 1)$ since it has a vertical asymptote at $x = 0$, so does not satisfy the hypotheses of the MVT.

4. $A = 30r - r^2$, so $r = 15$ gives the max area.

5. $f(x) = x^3 - 4\ln|x| + \frac{1}{2}x^2 + 2x - \frac{9}{2}$

6. $(\frac{1}{2} \cdot 2^{2/2} + \frac{2}{2} \cdot 2^{4/2} + \frac{3}{2} \cdot 2^{6/2} + \frac{4}{2} \cdot 2^{8/2})\frac{1}{2} = 49/2$

7. (a) $\frac{12}{11}x^{11/4} - \frac{8}{7}x^{7/4} + \frac{20}{3}x^{3/4} + C$
   (b) $\pi^2 x + \frac{6}{7}x^{7/6} - \mathrm{e}^x + C$
   (c) $(-\cot t + \csc t]_{\pi/4}^{\pi/2} = 2 - \sqrt{2}$
   (d) $\int_{-1}^{1}(1 - t^2)\,dt = (t - \frac{1}{3}t^3\big]_{-1}^{1} = \frac{4}{3}$
   (e) 0

8. $\dfrac{3x^5}{\tan(x^3) + \mathrm{e}^{x^3}}$

9. $\displaystyle\int_{-\pi}^{\pi} \cos x\,dx = 2$