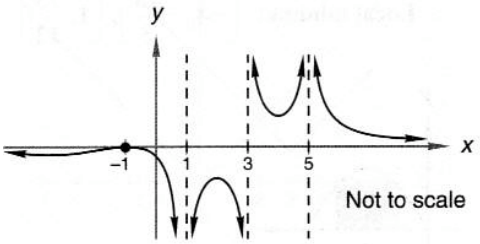
Calculus — Problem Set 41

2.



4. $P'(3) = 20000e^3 \approx 401711$

6. $y = -\frac{1}{2}x + \frac{3}{2}$

8. $\frac{\sqrt{2}\pi}{4}$ units^2

10. 44 units^2

12. Local Max:
(1.7564, 2.6223)
(7.7218, 8.9238)
Local Min:
(4.6035, -3.7422)
Zero: $x \approx 3.0996$

14. $-3\ln|t| + C$

16. $\frac{dy}{dx} = -x\left(x^2+1\right)^{-3/2}$

18. $\frac{dy}{dx} = \cot x$

20. $y' = 1 + \ln|x|$

22. $fg(x) = \frac{\ln x}{x}$
Domain:
$\{x \in R | x > 0\}$

24. $r = \frac{3}{5}h$

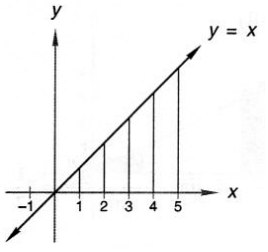
Calculus — Problem Set 42

2. $y' = \frac{\left(e^x - x\right)\cos x - \sin x\left(e^x - 1\right)}{\left(e^x - x\right)^2}$

4. $dy = \frac{vdu - udv}{v^2}$

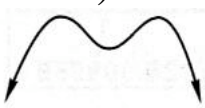
6. $\frac{dV}{dt} = \frac{1}{3}\pi r\left(r\frac{dh}{dt} + 2h\frac{dr}{dt}\right)$

8.



a) 15 units^2
b) 10 units^2
c) $\frac{25}{2}$ units^2
d) $\frac{25(n+1)}{2n}$ units^2

10. a) x = -1, 0, 1
b)



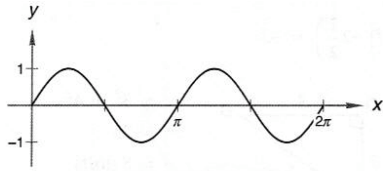
Local maxima: $\left(-1, -\frac{11}{4}\right), \left(1, -\frac{11}{4}\right)$

Local minimum: (0, –3)

12. $-\frac{8}{3}u^{3/2} + C$

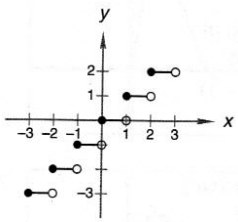
14. $\frac{dy}{dx} = -\frac{3}{2}x^2\left(x^3+3\right)^{-3/2}$

16. $s'(t) = t^{-3/2}\left(t^{1/2} - 1\right)$



18. $\left[0, \frac{\pi}{4}\right), \left(\frac{3\pi}{4}, \frac{5\pi}{4}\right), \left(\frac{7\pi}{4}, 2\pi\right]$

20. see pg. 77-78



$f(1.2) = 1$
$f(-1.5) = -2$

22. $f\left(-2\frac{1}{2}\right) = -3$

24. 45,150