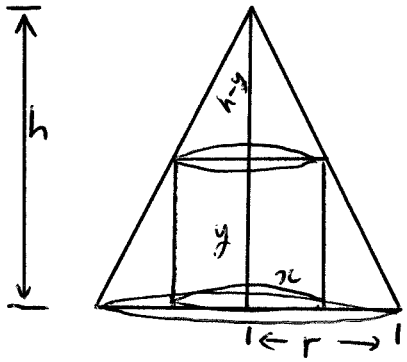
Solutions

MAT 1320 A **Assignment 5** (Due Wed. Dec. 1st, 8:30) **Student Number:**

Problem 1: §4.6 #24

Work:



Let x and y be the radius and height of the cylinder, respectively

Then, by similar triangles, $\frac{x}{r} = \frac{h-y}{h}$

so $h - y = \frac{xh}{r}$ or $y = h\left(1 - \frac{x}{r}\right)$

The volume is $V = \pi x^2 y = \pi x^2 h \left(1 - \frac{x}{r}\right)$

$= \pi h \left(x^2 - \frac{x^3}{r}\right)$

Then $V'(x) = \pi h \left(2x - \frac{3x^2}{r}\right) = 0$ if $x = 0$ or $x = \frac{2}{3}r$

Answer: $V =$ $\pi \left(\frac{2}{3}r\right)^2 h \left(1 - \frac{2}{3}\right) = \boxed{\frac{4}{27}\pi r^2 h}$

Problem 2: §4.7 #14

Work: (take $x_1 = 1$)

Let $f(x) = e^x - 3 + 2x$ $\qquad x_{n+1} = x_n - \frac{e^{x_n} - 3 + 2x_n}{e^{x_n} + 2} = \frac{(x_n - 1)e^{x_n} + 3}{e^{x_n} + 2}$

Then $f'(x) = e^x + 2$

$x_1 = 1$, $\quad x_2 = \frac{3}{e+2} = 0.6358246$, $\quad x_3 = 0.5946198$,

$x_4 = 0.594205 = x_5$ (stop)

Answer: $x \approx$ $\boxed{0.594205}$

Problem 3: §4.8 #16

Answer: $F(x) =$ $\boxed{x + \arctan x + C}$

Problem 4: §4.8 #28

Answer: $f(x) =$ $\boxed{4\arcsin x + 1 - \frac{2}{3}\pi}$

Problem 5: §4.8 # 36

Answer: $f(x) =$ $-\sin x + \frac{3}{2}x^2 + 3x + 1$

Problem 6: §5.1 # 12

Work:

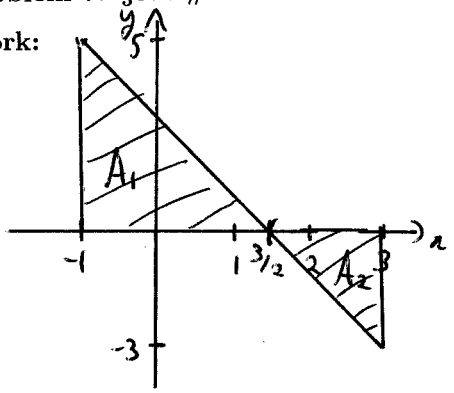
a) $L_5 = (12)(30 + 28 + 25 + 22 + 24)$

b) $R_5 = (12)(28 + 25 + 22 + 24 + 27)$

Answers: (a) $d \approx$ 1548 ft (b) $d \approx$ 1512 ft

Problem 7: §5.2 # 36

Work:



subtract area of smaller triangle

ie $\int_{-1}^{3} (3-2x)\,dx = A_1 - A_2$

$= \frac{1}{2}\left(\frac{3}{2} - (-1)\right)(5) - \frac{1}{2}\left(3 - \frac{3}{2}\right)(3)$

$= \frac{25}{4} - \frac{9}{4}$

Answer: $\int_{-1}^{3} (3 - 2x)\,dx =$ 4